DOCUMENT RESUME

ED 355 373 CE 063 199

AUTHOR	Siefer, Nancy; Latkiewicz, John
TITLE	Third Project Evaluation Report--Summative for Salt Lake Community College.
INSTITUTION	Salt Lake Community Coll., UT.
SPONS AGENCY	Office of Vocational and Adult Education (ED), Washington, DC. National Workplace Literacy Program.
PUB DATE	15 Aug 92
CONTRACT	V198A00091
NOTE	102p.
PUB TYPE	Reports - Evaluative/Feasibility (142)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	Adult Basic Education; *Adult Literacy; Evaluation Methods; *Literacy Education; *Manufacturing Industry; *On the Job Training; Outcomes of Education; Postsecondary Education; Program Development; *Program Effectiveness; Program Evaluation; Program Implementation
IDENTIFIERS	*Statistical Process Control; *Workplace Literacy

ABSTRACT

Through a federal grant, Salt Lake Community College (Utah), in conjunction with two area industries, implemented a workplace literacy project to serve 225 employees. The training included work-related curriculum and instruction in reading, English as a Second Language, oral communication skills, written communication skills, mathematics, and Pre-Statistical Process Control (SPC). A total of 360 employees participated in 40 training sessions during the 18 months of the grant's operation. The curriculum was developed with the help of advisory committees from the two industries (a semiconductor manufacturer and a sheet metal fabrication plant making computer casings). Subject matter was decided through literacy audits. Checklists, supervisors' rating sheets, students' and instructors' evaluations, personal interviews, and anecdotal summaries were used to assess the impact of the instruction upon the workers and the companies. This evaluation provided "hard" data indicating that the participating employees improved measurably in the areas targeted by the assessment. The evaluation plan also derived "soft" data in which the workers indicated other significant gains, such as increases in reading the daily newspaper, increased involvement in their children's homework and school activities, and improved self-confidence and self-esteem. (Extensive appendixes contain the following: sample reports of class results, a conference brochure, and the project director's report, including an overview, performance report, project objectives, recommendations, a list of dissemination activities, and project documents.) (KC)

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ED355373

Third Project Evaluation Report - Summative for Salt Lake Community College for Grant #V198A00091 Workplace Literacy - U.S.D.E.

prepared by

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and
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submitted August 15, 1992

for Grant Reriod April 1, 1990 - January 31, 1992

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WORKPLACE LITERACY - FINAL EVALUATION REPORT

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Executive Summary

Purpose

Through funding from the Department of Education, Salt Lake Community College, in conjunction with National Semiconductor Corp. (computer chip fabricator) and Natter Manufacturing Inc. (sheet metal fabricator), implemented a workplace literacy project to serve 225 employees. The training included work-related curriculum and instruction in reading, English as a second language (ESL), oral communication skills, written communication skills, math, and Pre-Statistical Process Control (SPC). The project director and secretary were assisted by seven part-time instructors and a counselor. A total of 360 employees participated in 40 training sessions within the 18 months of the grant's operation.

National Semiconductor Corp.

Working with the training coordinator, the project director established an advisory committee to guide the selection, assessment, and progress of the curriculum, the participants, and the classes. The advisory committee met every two weeks throughout the length of the project. Three hundred twenty-five employees (out of a workforce of 1150) attended 33 sessions in Pre-SPC, ESL, Refresher Math, and Technical Reading/Writing. The majority of the employees enrolled in the training exceeded grant objectives in spite of a downturn in the economy which resulted in numerous plant shut-downs during the grant's operating period. Workers attended classes twice a week for two hours on company time; that is, National Semiconductor encouraged participation by giving each employee total release time to attend classes. Each instructional session included whole group activity as well as individualized self-paced learning. Instructors developed a working curriculum based on the results of the literacy audit and encouraged class participants to provide the specific examples and incidents to make the curriculum relevant to their jobs. A curriculum writer assisted the instructors in the final editing and in establishing a common format for the curriculum. A variety of instruments was used to evaluate the participants, the classes, and the program as a whole. Project participants designed and utilized customized assessments as opposed to using standardized tests or measurements. Evaluation was multi-level; participants at all levels--workers, supervisors/managers, instructors, evaluators--evaluated themselves, the instructors, the course, and the program. Each participating worker had a file which included: SLCC admission's form; pre/post tests; individualized education plan; and representative assignments completed by the employee during the program.

Natter Manufacturing, Inc.

Natter Manufacturing is a sheet metal fabrication plant whose primary product is the production of computer casings. At the project's inception, Natter employed 250 workers but due to poor economic conditions locally and nationally, Natter's workforce fell to 125 by the end of the program. (In recent months Natter has experienced a mild resurgence and has brought back many of its laid-off employees.) Using the results of the literacy audit, the project director and the advisory committee, which met on an as-need basis, recommended classes in refresher and advanced math, communication, and ESL. The extensive

work-related ESL courses ranged from basic to advanced and included conversation and reading/writing. Thirty-five employees participated in the training taking primarily ESL classes and often taking more than one course. Workers attended classes twice a week for two hours with workers donating one hour of their time and Natter contributing one hour of company time. Instructors, with assistance from their students and a grant-supported curriculum writer, developed materials for the math, communication, and various levels of ESL. Natter, like National Semiconductor, utilized a variety of customized instruments to evaluate participating workers, the classes and quality of instruction, and the program as a whole. Checklists, supervisors' rating sheets, students' and instructors' evaluations as well as personal interviews and anecdotal summaries were used to assess the impact of the workplace instruction upon the individual worker and his/her area.

Conclusion

The project brought workers, supervisors, and managers together with educational specialists to plan and implement a workplace education program. An intensive and extensive evaluation plan provided "hard" data which indicated that the participating employees measurably improved in the areas targeted by the assessments. The evaluation plan also elicited "soft" data in which the workers indicated other significant gains not often measured by standard procedures. For example, the majority of participants cited an increase in reading the daily newspaper as a result of the program, increased involvement in their children's homework and school activities, and improved self-confidence and self-esteem. This project has demonstrated the dynamic interconnection between improved workplace literacy and increased involvement in general literacy events as well as participation in family literacy activities.

Introduction

On January 5-8, 1992, Dr. Nancy Siefer and Dr. John Latkiewicz conducted the last in a sequence of three project evaluations of the Workplace Literacy Project funded by the U.S. Dept. of Education. The evaluation consisted of a review of project documentation and materials and meetings with the principals which included:

Julie Van Moorhem, Project Director, SLCC
John Anjewierden, Division Chair
Joan Rond, Training Coordinator, National Semiconductor
Joy Spindler, Personnel Manager, Natter Manufacturing

Project Overview

Salt Lake Community College, in conjunction with National Semi-conductor Corp. (semi-conductor manufacturer) and Natter Manufacturing (sheet metal fabrication - computer casings), conducted a workplace literacy project designed to serve 225 employees of the companies involved. The training conducted included workplace literacy training related to reading, English as a second language, oral communication skills, written communication skills including technical writing, math and pre-Statistical Process Control. The project began on April 1, 1990 and, as the result of a no-cost project extension, ended on January 31, 1992. The budget for the project was $392,733.

Evaluation Elements

The elements of the evaluation included assessment of:

1. the procedures for documentation of activities related to the formal project objectives stated in the grant,

2. the implementation strategies being used and their effectiveness,

3. the project as it relates to time lines stated in the grant application,

4. the College's and the businesses' commitment to and level of involvement with the project, and

5. procedures and techniques for assessment and testing of participants.

Activities and Observations Related to the Evaluation Elements

1. **the procedures for documentation of activities related to the formal project objectives stated in the grant**

Files were maintained on each individual trainee. Included in each file were:

- a standard College admissions form,

- pre- and post- tests,

- an Individualized Education Plan (IEP), and
- representative and significant assignments completed by trainees as part of the program.

Sample files were provided as part of the first two reports. Rolls were also maintained which document attendance. The project director maintains separate files related to each objective listed in the project's evaluation plan (pp. 27-29 of the original grant application).

Documentation of efforts was a major focus of activities. The project ran into problems typical of demonstration projects (i.e., objectives formulated before implementation of a class change as the class is conducted, instructors focus on teaching first and documentation second; documentation sometimes a second priority). In an attempt to ensure that the appropriate data was collected, staff were in-serviced on evaluation by the internal evaluator and a format for presenting the results of each class developed and used to report results. (A sample report is included as Exhibit A.) The format allowed the results of individual classes to be articulated in terms of the product objectives and to make comparisons between classes. These reports, and the supporting documentation, in fact provided the basis for the conclusions reached related to achievement of the product objectives.

2. the implementation strategies being used and their effectiveness

3. the project as it relates to time lines stated in the grant application

The evaluation report as it relates to the two elements listed above is provided on a project objective by project objective basis. Since the evaluation elements are interrelated, they are jointly covered in the discussion of the process objectives.

Process Objective 1: Conduct literacy audit.

Although verification and modification of the literacy audit results was an on-going process as curriculum is developed, the objective was satisfied as described in the previous report. On-going efforts include meeting with the company curriculum committees and individual supervisor to refine curriculum.

Process Objective 2: Present audit results to management.

The objective has been met. Results were described in the previous report.

Process Objective 3: Perform task analysis for selected jobs.

The objective has already been accomplished and the accomplishments described in the previous report. On-going refinements were made. Efforts include meeting with the company curriculum committees and individual supervisors to refine curriculum.

Process Objectives 4 & 5: Design Curriculum / Develop Curriculum.

Curriculum was developed in the areas of:

- at National Semiconductor -

- Pre-SPC training,
- Refresher/Stepper Math,
- ESL Level 1, 2 and 3,
- Team Building, and
- Technical Reading/Writing;

- at Natter Manufacturing -

- Advanced Math,
- Vocational English for Special Purposes,
- Refresher Math,
- Workplace Communications, and
- Technical Reading/Writing.

Curriculum has been designed and executed for all courses. The project hoped to have curriculum developed which:

- followed a common format,
- was complete in terms of that format,
- was systematic, and
- with minor modification, could be taken off the shelf and used by instructors of future sections of the course or by other workplace literacy projects.

Although all instructors developed curriculum and although, for the most part, the developers met the above criteria, the curriculum cannot, as a whole, be said to meet the above criteria completely. The chart which appears on the page 7 provides an analysis of the curriculum. The columns on that chart deal with:

- Objectives
  - WPL oriented
  - quality overall
- Pre- and Post Tests
  - WPL oriented
  - pre-test developed, quality overall
  - post-test developed, quality overall
- Lesson Plans
  - WPL oriented
  - quality overall

- Class Activities/Materials
  - WPL oriented
  - quality overall
- Course Evaluations
  - WPL oriented
  - quality overall

As the chart indicates, the attempt to systematize the curriculum and ensure a WPL orientation succeeded for the most part for but not entirely. Suggestions for improvement of the curriculum design process are made in the Recommendations section.

Process Objective 6: Implement the program.

The project staff included:

SLCC

Julie Van Moorhem	Project Director
Mary Mellott	ESL Instructor/Assist. Dir.
Nancy Fillat	ESL Instructor
Julia Balcom	Math Instructor/Coordinator
Beth Malloy	Math Instructor
Don Allen	Math Instructor
Mark Merkley	Communication Instructor
Audrey Nelson	Reading/Writing Instructor
Monique de la Mare	Counselor
Shanna Dodge	Secretary
Arnette Starks	Secretary (replaced Shanna Dodge as of 9/3/91)
John Anjewierden	Division Chair (supervisor immediately over the program)

The main industry contacts for the program were as follows:

National Semi-Conductor

Joan Rond	Training Coordinator

Natter Manufacturing

Joy Spindler	Personnel Manager

The classes implemented include:

National Semiconductor

Class	Number Trained	Sessions Conducted
Pre-SPC Training	128	17
ESL	28	3
Refresher Math	154	12
Technical Reading/ Writing	15	1
Team Building	14	1

Natter Manufacturing

ESL I	10	2
ESL II	8	2
ESL Basic	4	1
ESL Conversation	7	1
ESL Reading/Writing	6	1
Workplace Communication	19	2
Technical Reading/Writing	7	1
Refresher Math	25	3
Advanced Math	10	1

As noted, documentation related to the training included individual trainee files (admissions paperwork, pre- and post- tests, and major assignments), attendance rolls and trainee evaluations of the trainer and the class. Evaluations conducted produced a favorable rating of all classes. The results of the evaluations correspond to the reports from supervisors and other company personnel all of which are favorable.

In terms of the numbers and focus of the training, the objective has been met. All content areas have been addressed. The numbers trained have exceeded those stated as part of the product objectives. As will be outlined as part of the product objectives, the implementation has been successful.

Although the project has succeeded, success according to the time line has been problematic. Because of lay-offs and other unforeseen events, the project ran behind schedule in terms of the classes offered. With the no-cost extension allowed by U.S.D.E., the project has, however, met the grant's objectives. This particular process objective can be considered to have been met for the most part.

Two sub-activities were not accomplished and need to be noted. The first relates to the "tutoring" program which was proposed as part of the project. The intent was to utilize student volunteers from the University of Utah's Bennion Community Services Center. The one factor that was not taken into account was the location of the companies involved relative to the University. They are for all practical purposes at different ends of a 30 mile by 30 mile valley. Public transportation is also quite limited. Traditionally, the area represented by the companies is underrepresented at the University. The volunteer pool to serve the companies was therefore non-existent.

The other problematic area was the "conference" to be hosted by the project. This particular effort is discussed Under Process Objective 8: Disseminate results.

Process Objective 7: Monitor/evaluate the program.

The first and second formative reports and this last summative evaluation themselves serve as documentation of the accomplishments related to this objective. Resumes for both the external and internal evaluator were included as part of the first formative evaluation report. On an on-going basis, the internal evaluator has been involved with set-up of the project management function including the documentation procedures, review of materials and periodic reviews of the project. The objective has been met.

Process Objective 8: Disseminate results.

The strategies related to this objective were largely acted upon during the last six months of the project. The project director and her staff planned the major dissemination effort, a conference to have been held in November of '91. All reasonable steps were taken to develop the conference. These include establishment of conference format and schedule, arrangements for speakers, design and distribution of a quality brochure (included as part of Exhibit B) and promotional activities supported by the College's Office of Workshops, Seminars and Conferences including mailed brochures and news articles. Despite these efforts, only 16 individuals actually signed up for the conference. Based upon the limited registration, the conference was cancelled.

In addition to the conference, the project has disseminated information through participation in the following conferences:

"Building Industrial Leaders through Literacy"
Mountain Plains Adult Education Association Conference
November 1991 - Sun Valley, Idaho
Mary Mellott and Julia Balcom

"Gaining Supervisor Support"
Mountain Plains Adult Education Association Conference
November 1991 - Sun Valley, Idaho
Julie Van Moorhem

"Workforce Literacy: What Are We Doing?"
June Vocational/Applied Technology Conference
June 1991 - Logan, Utah
Julie Van Moorhem

"Workplace Literacy in the 90's"
Utah Association for Adult, Community and Continuing Education Conference
October 1991 - Park City, Utah
Julie Van Moorhem

"Workplace Literacy: Partnerships for Success"
Midwest Regional Reading and Study Skills Conference
March 1992 - Kansas City, Missouri
Julie Van Moorhem

"Workplace Literacy: Partnerships for Success"
Mountain Plains Adult Education Association Conference
May 1992 - Salt Lake City, Utah
Julie Van Moorhem

In addition, National Semi-Conductor's training coordinator, the project director and internal evaluator prepared a manuscript for publication entitled Job-Linked Literacy Programs: Innovative Strategies at Work (Work in America Institute, Spring '92).

Product Objectives 1 - 8:

In consultation with the evaluation team, the Project Director has prepared a detailed report dealing with each of the objectives. The report is complete and a restatement of the report here by the evaluation team would not be anything more than redundant. Instead, a copy of the report is included as part of the evaluation (Exhibit C). The objectives, taken as a whole, were achieved. As the report details, some problems existed with regard to achievement of results and documentation of results. Given the scope of effort, however, the project clearly has met both the intent and the spirit of the objectives if not each letter in each objective.

4. the College's and the businesses' commitment to and level of involvement with the project

As in the first formative evaluation, each of the three partners was asked to provide a brief summary of their contributions related to the match outlined in the grant and any other contributions that have been made beyond the promised match. These summaries have been provided in Exhibit D.

In more general and global terms, commitment was demonstrated through

- forming active advisory committees at each company,
- making arrangements for personnel at all levels to meet with College staff as needed for curriculum development or forming curriculum teams, and for providing data, and
- providing of release time and/or overtime in order to facilitate employee participation in the program.

5. assessment and testing of participants

Assessment was a struggle for the project. The general project objectives provide a guideline for the course objectives but do not give clear direction for individual courses. Even with the data from the original task analyses, the instructors found that they needed to refocus their courses as they went along. Much of this was attributable to the newness of the staff to workplace literacy training and the inability of supervisors to clearly articulate needs. Although

the evaluators observed increasing facility with need analysis over the course of the project, the project continued to be a learning process for both instructors and supervisors clear until the end of the grant.

As a result of the above problems, course objectives were somewhat of a moving target. The upshot of these problems was that it was difficult to develop true pre-tests which encompassed all of the objectives or a post-test which corresponded to the pre-test in a meaningful way. To address this issue, the evaluators recommended that pre-tests be developed as units within courses as the courses became more clearly defined. The evaluators also recommended that the assessment procedures (as well as the curriculum) be developed with the ultimate program objectives clearly in mind.

To the credit of the project, the above problems stem in part from a commitment of the project and its personnel to develop course specific evaluations rather than relying on off-the-shelf, generic skill tests.

General Observations - Strengths, Areas for Improvement and Recommendations

As it relates to strengths ...

- The project director and her staff were committed to conducting a true workplace literacy program. Where problems occurred in terms of time line, it was in part due to the fact that the project was trying to do "it" (workplace literacy training) right the first time rather than taking short-cuts or skimping on workplace content.

- The experience and background of the project director and project staff were readily apparent. The project director possessed a mix of expertise in literacy and adult education, curriculum development skills and management skills. Her ability to work with the companies and maximize the opportunities presented and minimize the problems provided maximum return on the federal and local dollars involved.

- The project staff were held in high esteem by the company supervisors and managers. Student evaluations were likewise favorable.

- The participants were committed to the project. This was despite economic downturns which plagued both companies.

- The project was institutionalized. The project developed a formal relationship with the College's Center for Business and Economic Development. CBED will continue to conduct outreach to business and industry on behalf of workplace literacy.

- The College has been and continues to be committed to the project. The College is attempting to expand the grant effort both through additional U.S.D.E. funding and standard contracts for services.

As it relates to areas for improvement,

- A better understanding on the part of College administrators as to the parameters of the grant and the constraints of the grant.
- A more systematic approach to needs analysis, to incorporating the results into the design of the curriculum and to the tieing of curriculum to that needs analysis.
- Development of a guide for and/or system to the development of curriculum (preferably based upon a competency-based education model).
- Development of a guide for the documentation of curriculum and of instructional activities.
- Development of evaluation procedures related more closely to the objectives of the grant.
- In-servicing of administration and staff as to the above items.
- Improved communication within the companies.

As it relates to overall recommendations,

- Maintain the focus on workplace literacy. The grant afforded an opportunity for in-depth needs assessment and curriculum development. The challenge will be to maintain a focus on quality and not short-change the companies and their employees (nor allow the companies to short change themselves) by dressing up generic literacy approaches and selling them as workplace literacy.
- Hire and maintain a curriculum expert. The odds are that the majority of the instructional staff will not possess in-depth expertise in curriculum design and development nor in evaluation of curricula.
- Maintain an infrastructure (equipment and personnel (director, curriculum developer and secretary)) which can support workplace literacy efforts.
- Develop additional and alternative communication techniques for and within the companies, for example, newsletters and all-personnel or all-management meetings. If the project staff learned one thing, it was that company commitment at the line-level supervisor level is an on-going but critical struggle.
- Develop formats and protocols that ensure in-depth needs analysis, systematic development of curricula, the tieing of curricula and evaluation techniques to clearly articulated objectives, and systematic collection of useable and useful data.

Evaluation Summary

The project was a success. The delays experienced were largely the result of the uncontrollable economic circumstances of the business partners and the typical overly optimistic start-up plan. With the no-cost extension, the project

has successfully addressed both the process and the product objectives with only minor short-falls. The benefits of the project to the trainees, the companies and the College have, however, out-weighed these minor short falls. Both the business partners and the College have been fully committed to the project. The challenge will be to maintain the commitment in the absence of outside funding such as that provided by the federal grant.

Exhibit A - Sample - Reports by Instructors on Course

Exhibit B - Conference Brochure

Exhibit C - Product Objectives Report

Exhibit D - Partner Commitments

Exhibit A - Sample - Report by Instructors on Courses

English as a Second Language (ESL) Course Evaluation Summaries

Natter Manufacturing, Inc., 1990-1991

Instructor: Mary Mellott

I. Course description

The English as a Second Language classes at Natter Manufacturing are a part of the Workplace Literacy Training Project conducted by Salt Lake Community College. The ESL student/employees volunteer to attend classes. The company excuses the employees from one hour of work for each class and the employee donates one hour of their own time for each class. The classes meet two days a week, two hours each class. Most of the classes were scheduled with twelve week segments and the students at Natter were encouraged to continue from one twelve week segment into the next ESL segment.

All ESL students who expressed an initial interest in the program by signing the sign-up list, were given an individual assessment designed to determine their proficiency levels in reading and writing, and in speaking and listening tasks. The assessments were administered by the ESL instructors prior to the beginning of each course. All assessments were given during work hours at the companies and took approximately 30 minutes. Based on the results of these assessments, students/employees were divided into appropriate level classes.

A **Basic Level** class was designed for three interested students who were pre-literate in English. This class met only two hours a week due to scheduling difficulties.

ESL I class was designed for the intermediate skill level employees. This class met for a total of four hours each week.

ESL 2 class was designed for the most advanced skill level employees. This class met for a total of four hours each week.

ESL Conversation class was designed to improve conversation skills in order to increase social and work related communication. This class met for a total of four hours each week.

II. Course Participants

ESL students were selected for participation in the grant based on their English language proficiency. All students were non-native speakers of English, born outside of the United States. Their education levels varied from no previous formal education to completion of post-secondary programs. An assessment was administered to all interested/prospective employees, and selection was based on individual needs. Participation in all ESL classes was voluntary.

Attendance and Retention

Four ESL classes were taught at Natter.

ESL Basic: This course ran from November 19, 1990, through May 22, 1991, on Mondays and Wednesdays from 1:30-2:30 p.m.

4 students enrolled
3 students completed and received certificates

75% Retention

Employment was terminated for the one student not completing this course.

Attendance:	Actual Hours of Attendance	=	102
	Possible Hours of Attendance	=	120
	Rate	=	85%

ESL Level 1: This class ran February 28, 1991, through May 23, 1991, on Tuesdays and Thursday from 2:30-4:30 p.m.

9 students enrolled
4 students completed and received certificates
1 student continued but did not receive certification due to lack of attendance

---
55% Retention

Of the 4 students who did not complete the course, all of them could not participate in the second hour of class for personal reasons. Company policy required attendance during both hours.

Attendance:	Actual Hours of Attendance	=	245
	Possible Hours of Attendance	=	328
	Rate	=	75%

ESL Level 2: This class ran February 25, 1991, through May 22, 1991, on Mondays and Wednesdays from 2:30-4:30 p.m.

4 students enrolled
4 students completed and received certificates

100% Retention

Attendance:	Actual Hours of Attendance	=	176.5
	Possible Hours of Attendance	=	192
	Rate	=	92%

ESL Conversation: This class ran July 9, 1991, through September 19, 1991, on Tuesdays and Thursdays from 2:30-4:30 p.m.

7 students enrolled
5 students completed and received certificates
1 student continued but did not receive certification due to lack of attendance

---
85.71% Retention

One student did not complete the course due to lay-off.

Attendance:	Actual Hours of Attendance	=	184
	Possible Hours of Attendance	=	230
	Rate	=	80%

III. Course Content

The curriculum design was performance- based within the functional context of the employees jobs. The results of task analysis and interviews with company managers and supervisors were used to prepare course outlines. The **ESL I and 2** level classes had basically the same curriculum outline based on various workplace materials and employee situations appropriate for expanding English usage on the job. The difficulty level of the content was based on criterion-referenced pre-testing scores. The extent of students' mastery of course materials was determined by pre- and post-testing scores when appropriate.

The daily class format included reviews of Natter workplace written materials used by the employees, workplace vocabulary enhancement, role-play scenarios depicting actual situations employees encounter on the job, pronunciation and grammar instructions that were necessary to support the employees' continuing English usage, and computerized individual reading assignments to increase general reading levels in English.

The course content materials: move tags, assembly vocabulary, employee performance reviews, shop floor order travelers (routers), and level one statistical process control information, were selected as necessary job-related documents suitable for adaptation in the ESL curriculum.

The **ESL Conversation** course was designed to improve conversation skills in order to increase social and work related communication. By improving verbal, non-verbal, and listening skills through role-play and workplace simulations, oral communication skills could be enhanced. The course content outline included: polite listening skills, non-verbal communication, interviewing skills, and individual student presentations. All units were selected as necessary job-related communication tasks.

IV. Project Objectives Targeted by Course

ESL Basic: Four students enrolled in the class and three completed the first course. A meaning-centered approach based on the use of language experience stories, which employed the learner's own words and ideas was used with this class. Students were encouraged to take an active role in producing materials for class practice. Pretesting based on student-produced language experience stories was not feasible as the content of the material was unknown prior to the class. Repetition and re-cycling of the material was necessary and the time needed for mastery varied depending on the particular objective and the individual student.

Samples of student class materials indicate that improvements were made in every aspect of language learning. Their primary achievements have been to successfully fill out routine personal identification information forms and to recognize and respond appropriately to company safety signs. Supervisor reports validate the gains these students have made; they show an increased confidence in using the language on the job and have also increased participation in job-related social situations.

ESL Level 1: Nine students enrolled in the class and four completed the course. The pre- and post-test averages indicate that the class members achieved 80 percent mastery on two of the five unit tests that were given during the class. Average class gains of 43 percent and 47 percent were achieved on two other unit tests.

Pre/Post Test One (Using a Move Tag) -- 5 students took the pre- and post-test. The class average increased from 94 percent on the pre-test to 100 percent on the post-test, an average gain of 6 percent. The high scores on the pre- and post-testing reflect the students prior knowledge of this printed workplace form. The move tag is used in conjunction with other written workplace materials and its mastery is a necessary component of the job. Knowledge of the move tag relates to Product Objective 1: increase workplace literacy levels to prepare for advancement opportunities; Product Objective 3: increase ability to follow detailed sequential directions; Product Objective 4: increase recognition/ knowledge of workplace vocabulary and abbreviations; Product Objective 7: increase document literature related to use of manuals, work orders, etc.; and Product Objective 8: increase workplace writing skills.

Pre/Post Test Two (Assembly Vocabulary) -- 3 students took the pre- and post-test. The class average increased from 17 percent on the pre-test to 60 percent on the post-test, an average gain of 43 percent. The assembly vocabulary was specified by the company and contained items quite difficult for this ESL level. Although the 43 percent average gain was impressive and indicates acquired knowledge, the starting scores were very low and therefore the 80 percent required for mastery was not achieved. This content

material relates to Product Objective 1: increase workplace literacy levels to prepare for advancement opportunities; and Product Objective 4: increase recognition/ knowledge of workplace vocabulary and abbreviations.

Pre/Post Test Three -- (Employee Performance Reviews)

3 students took the pre- and post-test. The class average increased from 24 percent on the pre-test to 71 percent on the post-test, an average gain of 47 percent. The vocabulary contained in the company's employee performance reviews was rather advanced for this ESL level. Although the 47 percent average gain was impressive and indicates acquired knowledge, the starting scores were very low and therefore the 80 percent required for mastery was not achieved. This content material relates to Product Objective 1: increase workplace literacy levels to prepare for advancement opportunities; Product Objective 4: increase recognition/ knowledge of workplace vocabulary and abbreviations; and Product Objective 7: increase document literature related to use of manuals, work orders, etc.

Pre/Post Test Four -- (Router Abbreviations)

4 students took the pre- and post-test. The class average decreased from 88 percent on the pre-test to 84 percent on the post-test, an average loss of 4 percent. This loss can most likely be attributed to differences between the pre- and post-test design, as well as a lenghty delay between the two tests. The scores do indicate the students mastery of the material that is an essential part of their jobs. The router material relates to Product Objective 1: increase workplace literacy levels to prepare for advancement opportunities; Product Objective 3: increase ability to follow

detailed sequential directions; Product Objective 4: increase recognition/ knowledge of workplace vocabulary and abbreviations; and Product Objective 7: increase document literature related to use of manuals, work orders, etc.

Pre/Post Test Five (Statistical Process Control) -- 4 students took the pre- and post-test. The class average increased from 53 percent on the pre-test to 65 percent on the post-test, an average gain of 12 percent. This material was primarily company text that contained more advanced technical vocabulary. The instructor designed pre- and post-tests were not as significant for the students to master as the company designed SPC computer quizzes. Three of the four completing students also passed the company criteria (80 percent) for Statistical Process Control, Level One. They each received a Certificate of Accomplishment from the company. The SPC material relates to Product Objective 1: increase workplace literacy levels to prepare for advancement opportunities; Product Objective 3: increase ability to follow detailed sequential directions; Product Objective 4: increase recognition/ knowledge of workplace vocabulary and abbreviations; and Product Objective 7: increase document literature related to use of manuals, work orders, etc.

Product Objective 5: increase communications skills appropriate to the workplace, was met by daily class exercises and practices involving students in workplace simulations, role-play, and social conversations appropriate to the working environment. Improvements were noted by supervisors and other company personnel by reporting anecdotal data.

Product Objective 6: increase participation in team meetings, was not designed into the ESL class curriculum.

Product Objective 8: increase workplace writing skills, was met by regular exercises in the kind of writing needed to compiete company forms used by the students on their jobs. This writing was primarily limited to transfer of information tasks. Improvements were noticed by supervisors and other company personnel by reporting anecdotal data.

Product Objective 9: increase quantitative literacy skills, was not designed into the ESL class curriculum.

ESL Level 2: Four students attended and completed this class. The pre- and post-test averages indicate that all four members achieved at least 80 percent mastery on the five unit tests that were given during the class.

Pre/Post Test One (Using a Move Tag)	- -	3 students scored 100 percent on pre; 2 students scored 100 percent on post (only 1 student took both the pre- and the post-test). The high scores on the pre- and post-testing reflect the students' prior knowledge of this printed workplace form. The move tag is used in conjunction with other written workplace materials and its mastery is a necessary component of the job. Knowledge of the move tag relates to Product Objective1: increase workplace literacy levels to prepare for advancement opportunities; Product Objective 3: increase ability to follow detailed sequential directions; Product Objective 4: increase recognition/ knowledge of workplace vocabulary and abbreviations; Product Objective 7: increase document literacy related to use of manuals, work orders, etc.; and Product Objective 8: increase workplace writing skills.

Pre/Post Test Two -- (Assembly Vocabulary)

All 4 students took the pre- and post-test. The class average increased from 38 percent on the pre-test to 83 percent on the post-test, an average gain of 45 percent. The 45 percent average gain was impressive and indicates the students increased their knowledge of this content material and the 80 percent required for mastery was achieved. This content material relates to Product Objective 1: increase workplace literacy levels to prepare for advancement opportunities; and Product Objective 4: increase recognition/ knowledge of workplace vocabulary and abbreviations.

Pre/Post Test Three -- (Employee Performance Reviews)

All 4 students took the pre- and post-test. The class average increased from 68 percent on the pre-test to 89 percent on the post-test, an average gain of 21 percent. The 21 percent gain indicates the students increased their knowledge of this content material and achieved the 80 percent score required for mastery. The content material in this unit relates to Product Objective 1: increase workplace literacy levels to prepare for advancement opportunities; Product Objective 4: increase recognition/ knowledge of workplace vocabulary and abbreviations; and Product Objective 7: increase document literature related to use of manuals, work orders, etc.

Pre/Post Test Four -- (Router Abbreviations)

All 4 students took the pre- and post-test. The class average increased from 80 percent on the pre-test to 97 percent on the post-test, an average gain of 17 percent. The scores reflect the students mastery of content material that is an essential part of their jobs. The router material relates to Product Objective 1: increase workplace

literacy levels to prepare for advancement opportunities; Product Objective 3: increase ability to follow detailed sequential directions; Product Objective 4: increase recognition/ knowledge of workplace vocabulary and abbreviations; and Product Objective 7: increase document literature related to use of manuals, work orders, etc.

Pre/Post Test Five (Statistical Process Control) -- All 4 students took the pre- and post-test. The class average increased from 75 percent on the pre-test to 83 percent on the post-test, an average gain of 17 percent. All four students also passed the company criteria (80 percent) for SPC, Level One. They each received a Certificate of Accomplishment from the company. The SPC material relates to Product Objective 1: increase workplace literacy levels to prepare for advancement opportunities; Product Objective 3: increase ability to follow detailed sequential directions; Product Objective 4: increase recognition/ knowledge of workplace vocabulary and abbreviations; and Product Objective 7: increase document literature related to use of manuals, work orders, etc.

Product Objective 5: increase communications skills appropriate to the workplace, was met by daily class exercises and practices involving students in workplace simulations, role-play, and social conversations appropriate to the working environment. Improvements were noted by supervisors and other company personnel by reporting anecdotal data.

Product Objective 6: increase participation in team meetings, was not designed into the ESL class curriculum.

Product Objective 8: increase workplace writing skills, was met by regular exercises in the kind of writing needed to complete company forms used by the students on their jobs. This writing was primarily

limited to transfer of information tasks. Improvements were noted by supervisors and other company personnel by reporting anecdotal data.

Product Objective 9: increase quantitative literacy skills, was not designed into the ESL class curriculum.

ESL Conversation

Pre/Post Test One: -- (Polite Listening)

Four students took the pre- and post-test. The class average increased from 78 on the pre-test to 81 percent on the post-test, an average gain of 3 percent. This score indicates the students mastery of the content material. Knowledge of polite listening behavior relates to Product Objective 5: to increase communication skills appropriate to the workplace.

Pre/Post Test Two -- (Non-Verbal Communication)

Five students took the pre- and post-test. The class average decreased from 84 percent on the pre-test to 75 percent on the post-test, and average loss of 9 percent. This score is not representative of the total class knowledge of non-verbal communication. Two students had significant decreases in their post-test scores, most likely due to a misunderstanding of the post-testing procedure. These low scores account for the decreased class average. Non-verbal communication relates to product objective 5: to increase communication skills appropriate to the workplace.

V. Relation of Course to the Product Objectives and Task Analysis

The learning outcomes in the ESL classes were intended to parallel the Product Objectives specified in the grant.

For **ESL I and 2** classes, Statistical Process Control materials were adapted into the curriculum with non-native English speakers in mind whenever it was feasible. This content material is designed to relate to Product Objective 2: increase workplace literacy levels to prepare for technology upgrades.

Pre-tests were administered to determine the proficiency levels of employees' document literacy. Curriculum materials were designed using manuals, work orders, catalogs, and other work-related documents and were intended to relate to Product Objective1: increase workplace literacy levels to prepare for advancement opportunities.

After determining the proficiency level of employees' abilities to follow written instructions, suitable course materials were designed and implemented to enhance these skills. The content material included routers, move tags and assembly check lists and was designed to relate to Product Objective 3: increase ability to follow detailed, sequential directions and Product Objective7: increase document literacy related to use of manuals, work orders, etc.

The proficiency level of employees' recognition/knowledge of work-related vocabulary and abbreviations was also determined. Suitable course materials were then designed and implemented to enhance this knowledge. The content material included routers, move tags, assembly check lists, and performance reviews and was designed to relate to Product Objective 4: increase recognition/ knowledge of workplace vocabulary and abbreviations.

Daily writing exercises were designed to help increase the writing skills needed on the job and were intended to relate to Product Objective 8: increase workplace writing skills.

The **ESL Conversation** course was designed to improve conversation skills in order to increase social and work related communication. By improving verbal, non-verbal, and listening skills through role-play and workplace simulations, oral communication skills could be enhanced. A class interview of a supervisor and individual verbal presentations were used to relate to Product Objective 5: increase communication skills appropriate to the workplace.

VI Evaluation

Course content evaluations (pre- and post-tests) were administered at the beginning of each course content unit, in class, to determine the extent of students' mastery of course objectives. The content material within each unit pre- and post-test remained unchanged with only slight variations in formatting design.

Students were also asked to evaluate their own English abilities both before and after course completion. They were asked to evaluate the curriculum content after the first three weeks of class and again at the end of the course. This course survey was for students to express their interest level in the class content and the relevance of the course materials.

Supervisors were asked to evaluate individual student performance at the end of each twelve-hour segment of instruction. This evaluation checklist was used to assess the students' noticeable improvements on the job.

Instructors were evaluated by students at the conclusion of each course. A checklist was designed to inform the instructors of their classroom effectiveness.

A listening comprehension pre-assessment was administered to the employees enrolled in the **ESL Conversation** class. The assessment measure was intended to reflect the possible demands required for these employees in the workplace. This instrument was designed to measure individual listening comprehension levels and to determine the degree of congruity within the class. The assessment consisted of an audio tape of three recorded messages with progressive levels of difficulty. Following each message, students were required to answer multiple choice questions concerning the content of the taped message. The assessment took approximately one hour. This assessment was used only at the beginning of the course as a placement tool. It was not used again at the end of the course because other work-related pre-/post-tests were given during the course to determine mastery of class materials.

Course content evaluations (criterion-referenced pre-/post-tests) were given in conjunction with the class lessons. These were administered in class at the beginning of two units to determine the extent of students' mastery of course objectives. The course content materials: polite listening skills, non-verbal communication, interviewing skills, and individual student presentations were selected as necessary job-related communication tasks.

Conclusions and Recommendations

The ESL programs at Natter Manufacturing have been well received by management and employees. All parties have expressed satisfaction with the curriculum and the students' progress.

The initial pre-assessment for ESL students was highly skewed toward reading abilities. In future ESL programs, a more versatile assessment tool designed to also test speaking and listening skills would be more beneficial for student placement in ESL classes. Pre-assessments should also be done as close to the time of the scheduled classes as possible in order to get the most accurate estimates of student skills. By waiting up to ten months to attend class following the initial assessment, students' abilities are likely to be different.

Exhibit B - Conference Brochure

Exhibit C - Product Objectives Report

Final Performance Report

Overview

This report covers the partnership between Salt Lake Community College (SLCC) and two business partners, National Semiconductor Corporation (NSSL) and Natter Manufacturing, Inc., to provide opportunities for approximately 225 entry-level employees to enhance their basic skill levels in order to become more productive, promotable and prepared for technological advances in the industry and to develop a model workplace literacy program for dissemination of information, replication at local workplaces, and to serve as a basic skills workplace resource for the community.

The report is divided into the following sections: 1) Performance Report (Product Objectives, Schedule of Accomplishments, Quarterly Report {form used for entire project}, Changes in Key Personnel, Administrative Issues, Conclusions, Recommendations); 2) Dissemination Activities; and 3) Evaluation Activities.

Performance Report

The performance report presents data for each product objective. The schedule of accomplishments has been submitted in detail in the evaluators' report. A quarterly report form is used to detail data for the entire project; it is located at the end of the product objectives.

Some explanation of terminology or procedures is necessary for understanding the data presented in the Product Objectives.

1) 25% attendance: refers to employees who completed at least 25% of the course. This figure represents an attempt to be accountable for those employees who participated in the program and who should be affected by the protocol. However, it seemed unfair to count all employees who registered when some were unable to attend or dropped out after only a few days.

2) Mastery/ Gain Scores: Gain includes all employees who showed any gain in score from pre- to post-test; Mastery includes employees who achieved a score of at least 80% on a post-test; there is some overlap in the data because employees who achieved mastery are included in the Gain scores. For example, 20 employees showed gain and 10 of those same employees achieved mastery.

3) Hard vs. Soft Data: Hard data is that which resulted from tests or other empirical sources. Soft Data is that which resulted from interviews, comments on surveys, etc.

Product Objectives

Product Objective 1: increase the workplace literacy levels of approximately 225 targeted employees to prepare them for opportunities to advance to the next level of their job/job family

Activities conducted to achieve the objective:

The following classes were conducted:

A. **Natter Manufacturing, Inc.**

SESSION	CLASS	DATES	# SERVED (25%+ attendance)
ESL			
Session 1	Fall ESL I	Oct. 1990 - Jan. 1991	9
	Fall ESL II	Oct. 1990 - Jan. 1991	8
	ESL BASIC	Nov. 1990 - May 1991	3
Session 2	SPRING ESL I	Feb. 1991 - May 1991	7
	SPRING ESL II	Feb. 1991 - May 1991	4
Session 3	READ/WRITE	July 1991 - Sept. 1991	5
	CONVERSATION	July 1991 - Sept. 1991	5
MATH			
Session 1	REFRESHER	Oct. 1990 - Jan. 1991	12
	REFRESHER	Oct. 1990 - Jan. 1991	8
Session 2	REFRESHER	Feb. 1991 - May 1991	5
	ADVANCED	Feb. 1991 - May 1991	10
COMMUNICATIONS			
Session 2	WORKPLACE	Mar. 1991 - June 1991	12
Session 3	WORKPLACE	July 1991 - Oct. 1991	7
READING & WRITING			
Session 3	TECH READ/WRITE	July 1991 - Oct. 1991	

Attendance Rate	Retention Rate	Total#Enrolled	Total # Served (25%+ attendance)
80%	**75%**	**118**	**102**

Product Objective 1: increase the workplace literacy levels of approximately 225 targeted employees to prepare them for opportunities to advance to the next level of their job/job family

B. National Semiconductor

PRE-SPC

Session 1	PRE-SPC	Sept. 1990 - Dec. 1990	141

ESL

Session 1	ESL 1	Sept. 1990 - Jan. 1991	11
Session 2	ESL 2	Feb. 1991 - June 1991	9
Session 3	ESL 3	July 1991 - Jan. 1992	11

REFRESHER MATH

Session 2	REFRESHER IMA	Feb. 1991 - May 1991	11
	REFRESHER 2MA	Feb. 1991 - May 1991	9
	REFRESHER 3MA	Feb. 1991 - May 1991	15
	REFRESHER 4MA	Feb. 1991 - May 1991	17
	REFRESHER 5MA	Feb. 1991 - May 1991	16
	REFRESHER 6MA	Feb. 1991 - May 1991	15
Session 3	REFRESHER 1MB	May 1991 - August 1991	15
	REFRESHER 2MB	May 1991 - August 1991	6
	REFRESHER 3MB	May 1991 - August 1991	8
	REFRESHER 4MB	July 1991 -Dec. 1991	8
	REFRESHER 5MB	June 1991 - Sept. 1991	9
	REFRESHER 6MB	May 1991 - August 1991	8

READING & WRITING

Session 3	TECH READ/WRITE	July 1991 - Nov. 1991	14

TEAM BUILDING

Session 3	TEAM BUILDING	Nov. 1991-Jan. 1992	14

Attendance Rate	Retention Rate	Total#Enrolled	Total # Served (25%+ attendance)
86%	84%	367	345

Product Objective 1: increase the workplace literacy levels of approximately 225 targeted employees to prepare them for opportunities to advance to the next level of their job/job family

Projected Data Collection	**Actual Data Collected**
Individual Employee Files	Individual Employee Files
Assignments	Assignments
Pre/Post Test Results	Pre/Post Test Results
Promotion Opportunity Records	Supervisor Surveys
Promotion Records	Training Program Feedback Surveys

Explanation of discrepancy if necessary:

There are some minor differences in the projected data collection in support of this objective and the actual data collected. Due to the nationwide economic slump in the computer industry beginning Fall 1990 and continuing to the present, both companies experienced partial shutdowns, shutdowns, and lay-offs. There was virtually no opportunity for promotion at either company. Therefore, data gathered to indicate completion of this objective was garnered from surveys administered to supervisors for employees who completed the program. Questions in the survey focused on whether the employees had gained enough skill to be considered for or given promotions if economic conditions permitted.

Results:

Copies of the pre- and post-tests administered to participants and the results are in the participants' individual files.

A. Natter Manufacturing, Inc.

Individual Employee Files/Assignments:
On file.

Pre/Post Tests:

Refresher Math-- Out of 43 enrolled, 35 (81%) attended at least 25% of the course. Of the 35, 21 or 60% showed some gain and 11 or 26% of those participants showed gain to the mastery level.

English as a Second Language--Teacher observation and anecdotal data indicated that seventeen (17) of eighteen (18) students enrolled in three classes in the Fall attended 25% of the course. All seventeen (17) improved their skills in varying degrees. In the two Spring classes, eleven(11) of thirteen (13) students completed 25% of the course; of these 11, seven (7) achieved mastery, and eight (8) showed some gain. The ESL Conversation class had five (5) students of the seven (7) enrolled who completed 25% of the course; two (2) achieved mastery and three (3) showed some gain according to pre/post-test results. The ESL Reading/Writing class had five (5) students who completed 25% of the course. Hard data was unavailable for this class.

Product Objective 1: increase the workplace literacy levels of approximately 225 targeted employees to prepare them for opportunities to advance to the next level of their job/job family

In terms of unduplicated participants, 21 of the 23 participants attended at least 25% of the course; 16 of those 21, or 76%, either showed some overall gain from pre- to post-test or improvement was noted and 7, or 33%, achieved mastery level on one or more post-tests.

Workplace Communications--Out of 20 enrolled, 19 (95%) attended at least 25% of the course. Of the 19, 14 or 74% showed some gain and 7 or 37% of those participants showed gain to the 80% mastery level.

Technical Reading/Writing--Out of 7 enrolled, 7 (100%) attended at least 25% of the course. Of the 7, 5 or 71% of participants showed gain to the 80% mastery level.

Survey Data:

At the close of each class, a Training Program Fedback survey was administered to participants. This evaluation focused on four major areas of the program: General Feedback (description and purpose of training); the Trainer (knowledge, teaching ability,); Training Materials; Program Design; Other (like/dislike program, relationship of program to job and other training opportunities, suggestions for improvement). The items fit one of two forms--a rating scale (5=high) or comments/suggestions. Responses indicated that all classes at Natter Mfg., Inc. were rated in the range from 4.27 to 5.0, the average rating for all classes was 4.60. The average rating for the program at both companies was 4.26. Class averages are listed below.

Refresher Math: Responses indicated that all classes were rated in the range from 4.57 to 5.00, the average rating for all classes was 4.73.

English as a Second Language--Responses indicated that all classes were rated in the range from 4.40 to 4.91, the average rating for all classes was 4.46.

Workplace Communications--Responses indicated that all classes were rated in the range from 4.27 to 4.31, the average rating for all classes was 4.29.

Technical Reading/Writing--Responses indicated that average rating for the class was 4.46.

In addition, a Post-Program Participant Survey was administered to participants at the close of the program. Demographic data and program data were gathered. The survey focused on questions in the following areas: skills acquired through the program that were not present before participation; personal goals achieved (promotion, bid on new job, filling out accident/sick papers for work, being recognized/appreciated, understanding the job better); educational goals achieved (participate in/complete GED courses, enroll in college courses or professional training outside of work, increased participation in company training programs); increased community involvement (voting, reading newspaper, helping children with home work, reading, etc., volunteering in community/school programs); program recommended to cc workers; program changes recommended.

Product Objective 1: increase the workplace literacy levels of approximately 225 targeted employees to prepare them for opportunities to advance to the next level of their job/job family

At Natter Mfg. Inc., 18 responses were returned. The majority of participants stated that the program had helped them achieve or work toward the goal of promotion (56%); however, the program had not helped them in the area of bidding on a new job. Also, 89% of the respondents believed it brought them greater recognition and appreciation. In response to the question about program participation helping them understand their job better, 78% of the 18 respondents indicated it did (93% of the 15 respondents who answered this question).

While some respondents indicated they had achieved goals in the area of GED, college enrollment, company training programs, etc., the majority of respondents indicated that the program had not helped in these areas. The highest positive response occurred in relation to the question "Did the program contribute to increased participation in company training programs?"--39% of the 18 respondents (47% of the 15 who answered this question) answered "yes."

Several questions related to community involvement. Sixty-seven percent (67%) of the eighteen (18) respondents to this question indicated that as a direct result of the program they had increased their involvement in helping their children with reading, homework, and related activities. Also, 61% indicated they increased their reading of the newspaper as a result of the program. The overwhelming majority of participants indicated they would recommend this program to co-workers--78% (88% of the 16 who responded to this statement.).

Supervisors were also asked to rate participants on a Post-Program Supervisor Rating using a 4-point scale (4=high). Results, based on 28 responses, are shown in the chart below. NR=No Response; Yes or No responses are recorded in the first two columns.

SCALE	4	3	2	1	NR
QUESTION	**Yes**	**No**			
As a result of this program, the employee has					
asked about promotion opportunities?	29%	50%			21%
taken on more responsibility?	32%	39%	11%		21%
asked about other positions?	11%	46%	21%	4%	18%
If economic conditions permitted, employee might be considered for					
promotion?	25%	36%	11%	4%	25%
raise?	57%	11%	7%		25%

Product Objective 1: increase the workplace literacy levels of approximately 225 targeted employees to prepare them for opportunities to advance to the next level of their job/job family

SCALE	4	3	2	1	NR
QUESTION	**Yes**	**No**			
Do you feel more confident about the employee's performance?	39%	36%	4%		21%
As a result of this program have you noticed any changes in the employee's					
behavior?	25%	36%	7%	11%	21%
job attitude?	32%	36%	7%	4%	18%
quantity of work?	32%	39%	7%		21%
quality of work?	36%	36%	4%		25%
attendance?	39%	29%	7%		25%
job knowledge?	43%	29%	4%		25%

Comments are synthesized in the section on Soft Data.

B. National Semiconductor Corp.

Individual Employee Files/Assignments:
On file.

Pre/Post Tests:

Refresher Math-- Out of 156 enrolled, 137 (88%) attended at least 25% of the course. Of the 137,113 or 82% of the participants showed some gain and 86 or 63% of those showed gain to the mastery level.

Pre-SPC--Out of 141 enrolled, 141 attended at least 25% of the course. Of the 141, 91 or 65% of the participants showed some gain and 56 or 40% of those showed gain to the mastery level. Actually, only 106 participants took both pre- and post-tests. Based on this figure, 91 or 86% showed gain and 56 or 53% achieved mastery level. According to company records, 98% of the employees who took Pre-SPC achieved SPC certification.

English as a Second Language: A limited amount of hard data in the form of pre-post test results is available for the ESL classes. Out of eleven (11) students enrolled in the ESL 1 class, 11 (100%) attended 25% of the course. Teacher observation, anecdotal data and evaluation

indicated that all 11 improved their skills in varying degrees. Out of 9 students enrolled in the ESL 2 class, 9 (100%) attended 25% of the course. The 9 students showed an average gain of 13% from pre to post-test on the objectives tested. Out of eleven (11) students enrolled in the ESL 3 class 11 (100%) attended 25% of the course. In the ESL 3 class, 5 students who took the post-tests showed an average gain of 18% for the two units for which pre/post-tests were available. Data that is available suggests that gains were made by participants.

In terms of unduplicated participants, 28 of the 28 participants attended at least 25% of the course; 11 of those 28, or 39%, either showed some overall gain from pre- to post-test or improvement was noted. Individual data is unavailable for the other 17 participants, but aggregate data indicates gain for approximately 13 of those.

Technical Reading/Writing--Out of 15 enrolled, 14 attended at least 25% of the course. Of the 14, 13 or 93% of participants showed some gain and 10 or 71% of those showed gain to the mastery level.

Team Building--Out of 23 enrolled, 22 attended at least 25% of the course. Each participant did a pre- and post-self-evaluation and a team evaluation. Fourteen (14) participants who actually completed the course reported gains in awareness or knowledge of ten teamwork concepts. Supervisors evaluated each team also. Results of self-evaluations and team evaluations completed by participants and supervisors yielded results which indicated increases in awareness or knowledge of ten teamwork concepts. The data is presented below.

Pre-Post Self Evaluation: A self-evaluation form consisting of nine teamwork concepts which were to be ranked (5=high) was administered to participants. The total average score was 3.52 for the concepts. A post-self evaluation which used the same items asked participants to measure the percent of increase in their awareness and/or knowledge of those same concepts. Individual self-evaluations showed average increases of 62% to 78% for the nine teamwork concepts. The average percent of increase was 70.78 percent.

Pre-Post Team Evaluation: A team-evaluation form consisting of ten teamwork concepts which were to be ranked (5=high) was administered to each participant to evaluate the team. The average score was 3.24 for the concepts. A post-self evaluation which used the same items asked participants to measure the percent of increase in their awareness and/or knowledge of those same concepts. Individual member evaluations of the team showed average increases of 62% to 77% for the ten teamwork concepts. The average percent of increase was 71.33 percent.

Pre-Post Manager Team Evaluation: A team-evaluation form consisting of ten teamwork concepts which were to be ranked (5=high) was administered to each manager. The total average score was 3.00 for the concepts. A post-self evaluation which used the same items asked participants to measure the percent of increase in their awareness and/or knowledge of those same concepts. Supervisors' evaluations of the three teams' increases in awareness or knowledge of ten teamwork concepts showed average increases of 46%, 67% and 71% for an

Product Objective 1: increase the workplace literacy levels of approximately 225 targeted employees to prepare them for opportunities to advance to the next level of their job/job family

average increase of 61%. The total average percent of increase was 61.33 percent for the three teams.

Survey Data:

At the close of each class, a Training Program Fedback form was administered to participants. This evaluation focused on four major areas of the program: General Feedback (description and purpose of training); the Trainer (knowledge, teaching ability,); Training Materials; Program Design; Other (like/dislike program, relationship of program to job and other training opportunities, suggestions for improvement). The items fit one of two forms--a rating scale (5=high) or comments/suggestions. Responses indicated that all classes at National Semiconductor were rated in the range from 3.12 to 4.84, the average rating for all classes was 4.0. The average rating for the program at both companies was 4.26. Class averages are listed below.

Refresher Math--Responses indicated that all classes were rated in the range from 3.12 to 4.75, the average rating for all classes was 4.64.

Pre-SPC--Responses indicated that all classes were rated in the range from 4.06 to 4.70, the average rating for all classes was 4.38.

English as a Second Language--Responses indicated that all classes were rated in the range from 4.68 to 4.84, the average rating for all classes was 4.76.

Technical Reading/Writing--Responses indicated that the average rating for the class was 4.64.

Team Building--Responses indicated that the average rating for the class was 4.46

In addition, a Post-Program Participant Survey was administered to participants at the close of the program. Demographic data and program data were gathered. The survey focused on questions in the following areas: skills acquired through the program that were not present before participation; achieving personal goals (promotion, bid on new job, filling out accident/sick papers for work, being recognized/appreciated, understanding the job better); achieving educational goals (participate in/complete GED courses, enroll in college courses or professional training outside of work, increased participation in company training programs); increased community involvement (voting, reading newspaper, helping children with home work, reading, etc., volunteering in community/school programs); recommending program to co-workers; recommending program changes.

At National Semiconductor, 82 responses were returned. The majority of participants stated that the program had not helped them achieve goals such as promotion or bidding on a new job (74% and 84%, respectively). However, 48% of the respondents believed it brought them greater recognition and appreciation. In response to the question about program participation helping them understand their job better, 60% of the 82 respondents indicated it did (66% of

the 74 respondents who answered this question). While some respondents indicated they had achieved goals in the area of GED, college enrollment, company training programs, etc., the majority of respondents indicated that the program had not helped in these areas. Given the focus of the program, this was not unexpected. The highest positive response occurred in relation to the question "Did the program contribute to increased participation in company training programs?"--30% answered "yes."

Several questions related to community involvement. Thirty-five percent (35%) of the seventy-one (71) respondents to this question indicated that as a direct result of the program they had increased their involvement in helping their children with reading, homework, and related activities. The overwhelming majority of participants indicated they would recommend this program to co-workers--83% (91% of the 75 who responded to this statement.).

Supervisors were also asked to rate participants on a Post-Program Supervisor Rating using a 4-point scale (4=high). Results, based on 136 responses, are shown in the chart below. NR=No Response; Yes or No responses are recorded in the first two columns.

SCALE	4	3	2	1	NR
QUESTION	**Yes**	**No**			
As a result of this program, the employee has					
asked about promotion opportunities?	27%	67%			6%
taken on more responsibility?	7%	46%	26%	13%	8%
asked about other positions?	8%	29%	27%	28%	8%
If economic conditions permitted, employee might be considered for					
promotion?	15%	26%	35%	17%	7%
raise?	18%	40%	26%	10%	6%
Do you feel more confident about the employee's performance?	24%	40%	25%	7%	4%
As a result of this program have you noticed any changes in the employee's					
behavior?	13%	46%	22%	13%	6%

Product Objective 1: increase the workplace literacy levels of approximately 225 targeted employees to prepare them for opportunities to advance to the next level of their job/job family

	SCALE	4	3	2	1	NR
QUESTION		**Yes**	**No**			
job attitude?		13%	55%	22%	4%	6%
quantity of work?		12%	47%	35%	1%	5%
quality of work?		13%	50%	22%	2%	13%
attendance?		13%	43%	28%	6%	10%
job knowledge?		22%	47%	19%	4%	7%

Comments are synthesized in the section on Soft Data.

Discussion of the Results:

Hard Data: Results indicate that the training resulted in gains in literacy levels for the targeted number of participants. *Refresher Math* results indicated the most significant gains. Even though some participants did not achieve the mastery level, examination of the range of scores indicates that significant gains were made by some who scored at very low levels on the pre-test. Gains were very difficult to measure for *ESL* participants. Language acquisition requires an extensive amount of time. In some instances, data was not collected in an appropriate form for subsequent analysis. Aggregate and anecdotal data, however, suggest that gains were made by all participants in the ESL component of the program. *Team Building* was conducted as a pilot course and due to the nature of the course, a pre-test of content knowledge did not seem an appropriate measure. The measure of success for such a course often comes far after the course ends and teams have more opportunity to put into practice the concepts they learned. Therefore, the measures used were highly subjective, i.e., self-evaluations and team evaluations by participants and supervisors. These indicated that this was not only a very popular course, but the employees rated it very highly in terms of relationship/value to their jobs and the new direction the company is pursuing, i.e., self-managed teams. Workplace Communications participants showed gains in content knowledge, ability to present to a group; they also thought the class was very beneficial. *Technical Reading/Writing* scores indicated gains from pre- to post-test in vocabulary, using work-related manuals, and writing. The *Pre SPC* course was the first one taught and was beset by a number of circumstances which were later resolved. Due to these problems only 106 of the 141 participants took both the pre-and post-tests. Based on the number who actually took both tests, the results are much more favorable. Pre-SPC participants showed gain and 98% went on to achieve SPC Level I certification.

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Survey Data: The majority of participants at Natter Manufacturing, Inc. stated that the program had helped them achieve or work toward the goal of promotion (56%); however, the program had not helped them in the area of bidding on a new job. This seems to indicate that in spite of the economic conditions that prevailed during the grant period, i.e., the national economic slump that greatly affected computer-related industries and the company's shut-downs and lay-offs during the grant period, program participants still viewed the program as contributing to their chances for promotion even though those opportunities were not immediately available. However, 89% of the respondents believed it brought them greater recognition and appreciation. In response to the question about program participation helping them understand their job better, 78% of the 18 respondents indicated it did (93% of the 15 respondents who answered this question). This response alone indicates the value of the program. Leaders in the field of workplace literacy state that increased job understanding leads to increased job productivity, a major goal of workplace literacy programs from the employer's perspective.

While some respondents indicated they had achieved goals in the area of GED, college enrollment, company training programs, etc., the majority of respondents indicate that the program had not helped in these areas. Given the focus of the program, this was not unexpected. The highest positive response occurred in relation to the question "Did the program contribute to increased participation in company training programs?"--39% of the 18 respondents (47% of the 15 who answered this question) answered "yes."

Questions related to community involvement brought about an unexpected outcome of the program. Sixty-seven percent (67%) of the respondents to this question indicated that as a direct result of the program they had increased their involvement in helping their children with reading, homework, and related activities. This has major implications for increases in family literacy, and the potential for linking workplace and family literacy programs within the workplace. Also, 61% indicated they increased their reading of the newspaper as a result of the program. The overwhelming majority of participants indicated they would recommend this program to co-workers--78% (88% of the 16 who responded to this statement.). This indicates the workers valued the program.

While the majority of participants at National Semiconductor Corp. stated that the program had not helped them achieve goals such as promotion or bidding on a new job (74% and 84%, respectively), it must be stated that the national economic slump greatly affected computer-related industries and the company experienced shut-downs and lay-offs during the grant period. Consequently, there was little or no opportunity for promotion or bidding on new jobs within the company. In response to the question about program participation helping them understand their job better, 60% of the 92 respondents indicated it did (66% of the 74 respondents who answered this question). This response alone indicates the value of the program. Leaders in the field of workplace literacy state that increased job understanding leads to increased job productivity, a major goal of workplace literacy programs from the employer's perspective. While some respondents indicated they had achieved goals in the area of GED, college enrollment, company training programs, etc., the majority of respondents indicate that

Product Objective 1: increase the workplace literacy levels of approximately 225 targeted employees to prepare them for opportunities to advance to the next level of their job/job family

the program had not helped in these areas. Given the focus of the program, this was not unexpected.

Questions related to community involvement brought about an unexpected outcome of the program. Thirty-five percent (35%) of the respondents to this question indicated that as a direct result of the program they had increased their involvement in helping their children with reading, homework, and related activities. This has major implications for increases in family literacy, and the potential for linking workplace and family literacy programs within the workplace. The overwhelming majority of participants indicated they would recommend this program to co-workers--83% (91% of the 75 who responded to this statement.). This is a strong indicator of the value workers place on the program.

Soft Data: Results from survey data were overwhelmingly positive in terms of value and relationship of the courses to the employees' jobs. *Refresher Math* participants reported immediate use of skills learned/refreshed and equated it with increases in understanding their jobs better and enabling them to assume more responsibility, often on their own initiative. They also equated it with being able to see and solve problems on their own without assistance. *Workplace Communications and Team Building* participants believed that all employees should take the course and stated that it helped them understand not only their co-workers better but also management's perspective. They also reported increased ability to communicate with their co-workers and function better on teams, express themselves better in problem-solving, increased understanding of the team concept. *Pre-SPC* participants indicated a better understanding of what SPC was all about and that it made more sense to them. As a result of the course, they could see the value of it to the company and the need for accuracy in charting, math, etc. *ESL* participants reported increased understanding of their supervisors, increased speaking skills, and increased understanding of workplace language. Supervisors also reported the same kinds of skills increases and in some cases reported increased ability to handle more complex responsibilities. They also reported reduced time spent in explaining tasks to employees, less need for use of an interpreter, and increased productivity, especially at Natter Manufacturing, Inc. *Technical Reading/Writing* participants reported increases in ability to write better, more concise memos, passdowns, and ECN reports and to read and understand specifications and work vocabulary.

Self-confidence and self-esteem were greatly enhanced by program participation as reported by participants and supervisors. Most participants indicated that they achieved a sense of being recognized and appreciated more on the job as a result of their participation in the Workplace Literacy classes. *Supervisors* noted that participants tended to ask more questions, work more independently, increased job knowledge, increased accuracy in paperwork and math, seek more responsibility, help others more often, moved to more difficult jobs, applied new knowledge to the job, and in some cases improved attendance as a result of participation in the program. *Unexpected outcomes* occurred in the area of family literacy. Reports of increased involvement in children's reading, homework and school activities indicates a benefit from the program that was not expected at its inception. This has major implications for increases in family literacy and the potential for linking workplace and family literacy programs within the workplace.

Product Objective 1: increase the workplace literacy levels of approximately 225 targeted employees to prepare them for opportunities to advance to the next level of their job/job family

Overall achievement:

Overall, the objective to increase the literacy skills of approximately 225 employees to prepare them for opportunities to advance to the next level of their job/job family was not only met but exceeded. At National Semiconductor Corp. of 273 unduplicated participants who attended at least 25% of at least one course, 211 or 77% showed some gain or improvement was noted and 139 or 51% achieved mastery level. Eighteen (18) ESL participants were not included in the gain figure noted because the data was incomplete; however, anecdotal data and teacher observation and the pre/post testing that was completed indicate gain for most of them. At Natter Mfg., of 60 unduplicated participants who attended at least 25% of at least one course, 45 or 75% showed some gain or improvement and 23 or 38% achieved mastery level.

Combined figures for both companies resulted in the following data: There were 333 unduplicated participants in the program who attended at least 25% of at least one course. Of these 333, 256 or 77% showed some gain and 162 or 49% achieved mastery. If the other 18 ESL students were included, the gain figure was 274 or 82%.

Even though there was little or no opportunity for promotion during the project period due to national economic conditions which had a heavy impact on these two companies, these employees are better prepared and more likely to seek and/or be given opportunities to advance than they would have prior to participation in the workplace literacy project.

Product Objective 2: increase the workplace literacy levels of approximately 225 employees so they can obtain additional training for technology upgrades, such as a higher level of SPC certification.

Activities conducted to achieve the objective:

The following classes were conducted:

A. **Natter Manufacturing, Inc.**

SESSION	CLASS	DATES	# SERVED (25%+ attendance)
ESL			
Session 1	Fall ESL I	Oct. 1990 - Jan. 1991	9
	Fall ESL II	Oct. 1990 - Jan. 1991	8
	ESL BASIC	Nov. 1990 - May 1991	3
Session 2	SPRING ESL I	Feb. 1991 - May 1991	7
	SPRING ESL II	Feb. 1991 - May 1991	4
Session 3	READ/WRITE	July 1991 - Sept. 1991	5
	CONVERSATION	July 1991 - Sept. 1991	5
MATH			
Session 1	REFRESHER	Oct. 1990 - Jan. 1991	12
	REFRESHER	Oct. 1990 - Jan. 1991	8
Session 2	REFRESHER	Feb. 1991 - May 1991	5
	ADVANCED	Feb. 1991 - May 1991	10
COMMUNICATIONS			
Session 2	WORKPLACE	Mar. 1991 - June 1991	12
Session 3	WORKPLACE	July 1991 - Oct. 1991	7
READING & WRITING			
Session 3	TECH READ/WRITE	July 1991 - Oct. 1991	7

Attendance Rate	Retention Rate	Total#Enrolled	Total# Served (25%+ attendance)
80%	75%	118	102

Product Objective 2: increase the workplace literacy levels of approximately 225 employees so they can obtain additional training for technology upgrades, such as a higher level of SPC certification.

B. National Semiconductor

PRE-SPC

Session 1	PRE-SPC	Sept. 1990 - Dec. 1990	141

ESL

Session 1	ESL 1	Sept. 1990 - Jan. 1991	11
Session 2	ESL 2	Feb. 1991 - June 1991	9
Session 3	ESL 3	July 1991 - Jan. 1992	11

REFRESHER MATH

Session 1	REFRESHER 1MA	Feb. 1991 - May 1991	11
	REFRESHER 2MA	Feb. 1991 - May 1991	9
	REFRESHER 3MA	Feb. 1991 - May 1991	15
	REFRESHER 4MA	Feb. 1991 - May 1991	17
	REFRESHER 5MA	Feb. 1991 - May 1991	16
	REFRESHER 6MA	Feb. 1991 - May 1991	15
Session 3	REFRESHER 1MB	May 1991 - August 1991	15
	REFRESHER 2MB	May 1991 - August 1991	6
	REFRESHER 3MB	May 1991 - August 1991	8
	REFRESHER 4MB	July 1991 - Dec. 1991	8
	REFRESHER 5MB	June 1991 - Sept. 1991	9
	REFRESHER 6MB	May 1991 - August 1991	8

READING & WRITING

Session 3	TECH READ/WRITE	July 1991 - Nov. 1991	14

TEAM BUILDING

Session 3	TEAM BUILDING	Nov. 1991 - Jan. 1992	14

Attendance Rate	Retention Rate	Total#Enrolled	Total# Served (25%+ attendance)
86%	84%	367	345

Product Objective 2: increase the workplace literacy levels of approximately 225 employees so they can obtain additional training for technology upgrades, such as a higher level of SPC certification.

Projected Data Collection
Individual Employee Files
Assignments
Pre/Post Test Results
Tech. Upgrade Enrollment Records
Employee observation on job

Actual Data Collected
Individual Employee Files
Assignments
Pre/Post Test Results
Tech. Upgrade Enrollment Records
Supervisor Surveys
Training Program Feedback Surveys
Employee observation on job

Explanation of discrepancy if necessary:

There are some minor differences in the projected data collection in support of this objective and the actual data collected. Due to the nationwide economic slump in the computer industry beginning Fall 1990 and continuing to the present, both companies experienced partial shutdowns, shutdowns, and lay-offs. Therefore, data gathered to indicate completion of this objective was garnered from surveys administered to participants. Questions in the survey focused on whether the classes helped participants achieve goals such as participation in other training offered by the company. Also, records of SPC certification upgrades or other kinds of training were provided by the training coordinator/personnel manager.

Results:

Copies of the pre- and post-tests administered to participants and the results are in the participants' individual files.

A. Natter Manufacturing, Inc.

Individual Employee Files/Assignments:
On file.

Pre/Post Tests:

Refresher Math-- Out of 43 enrolled, 35 (81%) attended at least 25% of the course. Of the 35, 21 or 60% of the participants showed some gain and 9 or 26% of those achieved the mastery level.

English as a Second Language--Teacher observation and anecdotal data indicated that seventeen (17) of eighteen (18) students enrolled in three classes in the Fall attended 25% of the course. All seventeen (17) improved their skills in varying degrees. In the two Spring classes, eleven(11) of thirteen (13) students completed 25% of the course; of these 11, eight (8) showed some gain and seven (7) achieved mastery. The ESL Conversation class had five (5) students of the seven (7) enrolled who completed 25% of the course; three (3) showed some gain according to pre/post-test results and two (2) achieved mastery level. The ESL

Product Objective 2: increase the workplace literacy levels of approximately 225 employees so they can obtain additional training for technology upgrades, such as a higher level of SPC certification.

Reading/Writing class had five (5) students who completed 25% of the course. Hard data was unavailable for this class.

In terms of unduplicated participants, 21 of the 23 participants attended at least 25% of the course; 16 of those 21, or 76%, either showed some overall gain from pre- to post-test or improvement was noted and 7, or 33%, achieved mastery level on one or more post-tests.

Workplace Communications--Out of 20 enrolled, 19 (95%) attended at least 25% of the course. Of the 19, 14 or 74% of the participants showed some gain and 7 or 37% of those showed gain to the mastery level.

Technical Reading/Writing--Out of 7 enrolled, 7 (100%) attended at least 25% of the course. Of the 7, 5 or 71% of the participants showed gain to the mastery level.

B. National Semiconductor Corp.

Individual Employee Files/Assignments:
On file.

Pre/Post Tests:

Pre-SPC--Out of 141 enrolled, 141 attended at least 25% of the course. Of the 141, 91 or 65% of the participants showed some gain and 56 or 40% of those showed gain to the mastery level. Actually, only 106 participants took both pre- and post-tests. Based on this figure, 91 or 86% showed gain and 56 or 53% achieved mastery level. According to company records, 98% of the employees who took the Pre-SPC course later achieved SPC Level 1 certification.

Refresher Math-- Out of 156 enrolled, 137 (88%) attended at least 25% of the course. Of the 137, 113 or 82% of the participants showed some gain and 86 or 63% of those achieved the mastery level.

English as a Second Language--A limited amount of hard data in the form of pre-post test results is available for the ESL classes. Out of eleven (11) students enrolled in the ESL 1 class, 11 (100%) attended 25% of the course. Teacher observation, anecdotal data and evaluation indicated that all 11 improved their skills in varying degrees. Out of 9 students enrolled in the ESL 2 class, 9 (100%) attended 25% of the course. The 9 students showed an average gain of 13%. Out of eleven (11) students enrolled in the ESL 3 class, 11 (100%) attended 25% of the course. In the ESL 3 class, 5 students who took the post-tests showed an average gain of 18% for the two units for which pre/post-tests were available. Data that is available suggests that gains were made by participants. Individual data is unavailable for the other 17 participants, but aggregate data indicates gain for approximately 13 of those.

Product Objective 2: increase the workplace literacy levels of approximately 225 employees so they can obtain additional training for technology upgrades, such as a higher level of SPC certification.

In terms of unduplicated participants, 28 of the 28 participants attended at least 25% of the course; 11 of those 28, or 39%, either showed some overall gain from pre- to post-test or improvement was noted. Data was unavailable for seventeen participants.

Technical Reading/Writing--Out of 15 enrolled, 14 attended at least 25% of the course. Of the 14, 13 or 93% of the participants showed some gain and 10 or 71% of those achieved mastery level.

Team Building--Out of 23 enrolled, 22 attended at least 25% of the course. Each participant did a pre- and post-self-evaluation and a team evaluation. Fourteen(14) participants who actually completed the course reported gains in awareness or knowledge of ten teamwork concepts. Supervisors evaluated each team also. Results of self-evaluations and team evaluations completed by participants and supervisors yielded results which indicated increases in awareness or knowledge of ten teamwork concepts. The results are listed below.

Pre-Post Self Evaluation: A self-evaluation form consisting of nine teamwork concepts which were to be ranked from 1 (low) to 5 (high) was administered to participants. The total average score for the concepts was 3.52 . A post-self evaluation which used the same items asked participants to measure the percent of increase in their awareness and/or knowledge of those same concepts. Individual self-evaluations showed average increases of 62% to 78% for the ten teamwork concepts. The average percent of increase was 70.78 percent.

Pre-Post Team Evaluation: A team-evaluation form consisting of ten teamwork concepts which were to be ranked from 1 (low) to 5 (high) was administered to each participant to evaluate the team. The average score for the concepts was 3.24. A post-self evaluation which used the same items asked participants to measure the percent of increase in their awareness and/or knowledge of those same concepts. Individual member evaluations of the team showed average increases of 62% to 77% for the ten teamwork concepts. The average percent of increase was 71.33 percent.

Pre-Post Manager Team Evaluation: A team-evaluation form consisting of nine teamwork concepts which were to be ranked from 1 (low) to 5 (high) was administered to each manager. The total average score was 3.00 for the concepts. A post-self evaluation which used the same items asked participants to measure the percent of increase in their awareness and/or knowledge of those same concepts. Supervisors' evaluations of the three teams' increase in awareness or knowledge of ten teamwork concepts showed average increases of 46%, 67% and 71% for an average increase of 61%. The total average percent of increase was 61.33 percent for the three teams.

Survey Data:

At the close of each class, a Training Program Feedback survey was administered to participants. This evaluation focused on four major areas of the program: General Feedback (description and purpose of training); the Trainer (knowledge, teaching ability,); Training

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Materials; Program Design; Other (like/dislike program, relationship of program to job and other training

opportunities, suggestions for improvement). The items fit one of two forms- rating scale (5=high) or comments/suggestions. Responses indicated that all classes at Natter Mfg., Inc. were rated in the range from 4.27 to 5.0, the average rating for all classes was 4.60. The average rating for the program at both companies was 4.26. Class averages are listed below.

Refresher Math: Responses indicated that all classes were rated in the range from 4.57 to 5.00; the average rating for all classes was 4.73.

English as a Second Language--Responses indicated that all classes were rated in the range from 4.40 to 4.91; the average rating for all classes was 4.46.

Technical Reading/Writing--Responses indicated that the average rating for the class was 4.46.

Workplace Communications--Responses indicated that all classes were rated in the range from 4.27 to 4.31; the average rating for all classes was 4.29.

In addition, a Post-Program Participant Survey was administered to participants at the close of the program. Demographic data and program data were gathered. The survey focused on questions in the following areas: skills acquired through the program that were not present before participation; personal goals achieved (promotion, bid on new job, filling out accident/sick papers for work, being recognized/appreciated, understanding the job better); educational goals achieved (participate in/complete GED courses, enroll in college courses or professional training outside of work, increased participation in company training programs); increased community involvement (voting, reading newspaper, helping children with home work, reading, etc., volunteering in community/school programs); program recommended to cc workers; program changes recommended.

At Natter Mfg., Inc., responses were returned. The majority of participants stated that the program had helped them achieve or work toward the goal of promotion (56%); however, the program had not helped them in the area of bidding on a new job. Also, 89% of the respondents believed it brought them greater recognition and appreciation. In response to the question about program participation helping them understand their job better, 78% of the 18 respondents indicated it did (93% of the 15 respondents who answered this question).

While some respondents indicated they had achieved goals in the area of GED, college enrollment, company training programs, etc., the majority of respondents indicate that the program had not helped in these areas. The highest positive response occurred in relation to the question "Did the program contribute to increased participation in company training programs?"--39% of the 18 respondents (47% of the 15 who answered this question) answered "yes."

Product Objective 2: increase the workplace literacy levels of approximately 225 employees so they can obtain additional training for technology upgrades, such as a higher level of SPC certification.

Several questions related to community involvement. Sixty-seven percent (67%) of the eighteen (18) respondents to this question indicated that as a direct result of the program they had increased their involvement in helping their children with reading, homework, and related activities. Also, 61% indicated they increased their reading of the newspaper as a result of the program. The overwhelming majority of participants indicated they would recommend this program to co-workers--78% (88% of the 16 who responded to this statement.).

Supervisors were also asked to rate participants on a Post-Program Supervisor Rating using a 4-point scale (4=high). Results, based on 28 responses, are shown in the chart below. NR=No Response; Yes or No responses are recorded in the first two columns.

SCALE	4	3	2	1	NR
QUESTION	**Yes**	**No**			
As a result of this program, the employee has					
asked about promotion opportunities?	29%	50%			21%
taken on more responsibility?	32%	39%	11%		21%
asked about other positions?	11%	46%	21%	4%	18%
If economic conditions permitted, employee might be considered for					
promotion?	25%	36%	11%	4%	25%
raise?	57%	11%	7%		25%
Do you feel more confident about the employee's performance?	39%	36%	4%		21%
As a result of this program have you noticed any changes in the employee's					
behavior?	25%	36%	7%	11%	21%
job attitude?	32%	36%	7%	4%	18%
quantity of work?	32%	39%	7%		21%
quality of work?	36%	36%	4%		25%

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	SCALE	4	3	2	1	NR
QUESTION		**Yes**	**No**			
attendance?		39%	29%	7%		25%
job knowledge?		43%	29%	4%		25%

The same Training Program Fedback survey was administered to participants at National Semiconductor. This evaluation focused on four major areas of the program: General Feedback (description and purpose of training); the Trainer (knowledge, teaching ability,); Training Materials; Program Design; Other (like/dislike program, relationship of program to job and other training opportunities, suggestions for improvement). The items fit one of two forms--a rating scale (5-high)or comments/suggestions. Responses indicated that all classes at National Semiconductor were rated in the range from 3.12 to 4.84, the average rating for all classes was 4.0. The average rating for the program at both companies was 4.26. Class averages are listed below.

Pre-SPC--Responses indicated that all classes were rated in the range from 4.06 to 4.70; the average rating for all classes was 4.38.

Refresher Math--Responses indicated that all classes were rated in the range from 3.12 to 4.75; the average rating for all classes was 4.64.

English as a Second Language--Responses indicated that all classes were rated in the range from 4.68 to 4.84; the average rating for all classes was 4.76.

Technical Reading/Writing--Responses indicated that the average rating for the class was 4.64.

Team Building--Responses indicated that the average rating for the class was 4.46

In addition, a Post-Program Participant Survey was administered to participants at the close of the program. Demographic data and program data were gathered. The survey focused on questions in the following areas: skills acquired through the program that were not present before participation; achieving personal goals (promotion, bid on new job, filling out accident/sick papers for work, being recognized/appreciated, understanding the job better); achieving educational goals (participate in/complete GED courses, enroll in college courses or professional training outside of work, increased participation in company training programs); increased community involvement (voting, reading newspaper, helping children with home work, reading, etc., volunteering in community/school programs); recommending program to co-workers; recommending program changes.

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At National Semiconductor, 82 responses were returned. The majority of participants stated that the program had not helped them achieve goals such as promotion or bidding on a new job (74% and 84%, respectively). However, 48% of the respondents believed it brought them greater recognition and appreciation. In response to the question about program participation helping them understand their job better, 60% of the 82 respondents indicated it did (66% of the 74 respondents who answered this question). While some respondents indicated they had achieved goals in the area of GED, college enrollment, company training programs, etc., the majority of respondents indicate that the program had not helped in these areas. Given the focus of the program, this was not unexpected. The highest positive response occurred in relation to the question "Did the program contribute to increased participation in company training programs?"--30% answered "yes."

Several questions related to community involvement. Thirty-five percent (35%) of the seventy-one (71) respondents to this question indicated that as a direct result of the program they had increased their involvement in helping their children with reading, homework, and related activities. The overwhelming majority of participants indicated they would recommend this program to co-workers--83% (91% of the 75 who responded to this statement.).

Supervisors were also asked to rate participants on a Post-Program Supervisor Rating using a 4-point scale (4=high). Results, based on 136 responses, are shown in the chart below. NR=No Response; Yes or No responses are recorded in the first two columns.

SCALE	4	3	2	1	NR
QUESTION	**Yes**	**No**			
As a result of this program, the employee has					
asked about promotion opportunities?	27%	67%			6%
taken on more responsibility?	7%	46%	26%	13%	8%
asked about other positions?	8%	29%	27%	28%	8%
If economic conditions permitted, employee might be considered for					
promotion?	15%	26%	35%	17%	7%
raise?	18%	40%	26%	10%	6%
Do you feel more confident about the employee's performance?	24%	40%	25%	7%	4%

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	SCALE	4	3	2	1	NR
QUESTION		**Yes**	**No**			
As a result of this program have you noticed any changes in the employee's						
behavior?		13%	46%	22%	13%	6%
job attitude?		13%	55%	22%	4%	6%
quantity of work?		12%	47%	35%	1%	5%
quality of work?		13%	50%	22%	2%	13%
attendance?		13%	43%	28%	6%	10%
job knowledge?		22%	47%	19%	4%	7%

Comments for both companies are synthesized in the section on Soft Data.

Discussion of the Results:

Hard Data: Results indicate that the training resulted in gains in literacy levels. *Math* results indicate the most significant gains. Even though some participants did not achieve the mastery level, examination of the range of scores indicates that some who scored at very low levels on the pre-test achieved significant gains even though they did not reach the mastery level. Gains were difficult to measure for *ESL* participants. Where pre-post-test results were available, the data indicated that the participants attained mastery in some areas and at least gain in others. Anecdotal data and supervisor/teacher observation formed part of the evaluation data. *Team Building* was conducted as a pilot course and due to the nature of the course, a pre-test of content knowledge did not seem an appropriate measure. The measure of success for such a course often comes far after the course ends and teams have more opportunity to put into practice the concepts they learned. Therefore, the measures used were highly subjective, i.e., self-evaluations and team evaluations by participants and supervisors. These indicated that this was not only a very popular course, but the employees rated it very highly in terms of relationship/value to their jobs and the new direction the company is pursuing, i.e., self-managed teams. *Technical Reading/Writing* scores indicated gains from pre- to post-test, especially in vocabulary, following directions, and writing passdowns, memos, etc.. *Pre-SPC* data indicated significant gains from pre-to post-testing in vocabulary and math skills. Actually, only 106 participants took both pre- and post-tests due to difficulties encountered during this initial part of the program. Based on this figure, 91 or 86% showed gain and 56 or

Product Objective 2: increase the workplace literacy levels of approximately 225 employees so they can obtain additional training for technology upgrades, such as a higher level of SPC certification.

53% achieved mastery level. At National Semiconductor, 98% of the employees who took Pre-SPC later achieved SPC Level 1 certification.

Soft Data: Results from survey data were overwhelmingly positive in terms of value and relationship of the courses to the employees' jobs. *Math* participants reported immediate use of skills learned/refreshed and equated it with increases in understanding their jobs better and enabling them to assume more responsibility, often on their own initiative. They also equated it with being able to see and solve problems on their own without assistance. *Workplace Communications and Team Building* participants believed that all employees should take the course and stated that it helped them understand not only their co-workers better but also management's perspective. *Pre-SPC* participants indicated a better understanding of what SPC was all about and that it made more sense to them as a result of the course. They also could see the value of it to the company and the need for accuracy in charting, math, etc. *ESL* participants reported increased understanding of their supervisors, increased speaking skills, and increased understanding of workplace language. *Supervisors* of these employees also reported the same kinds of skills increases and in some cases reported increased ability to handle more complex responsibilities. They also reported reduced time spent in explaining tasks to employees, less need for use of an interpreter, and increased productivity, especially at Natter Manufacturing, Inc. *Technical Reading/Writing* participants reported increases in ability to understand specifications, work-related vocabulary, write passdowns, reports and memos, etc. Self-confidence and self-esteem were greatly enhanced by program participation as reported by both participants and supervisors. Most participants indicated that they achieved a sense of being recognized and appreciated more on the job and understanding their jobs better as a result of their participation in the Workplace Literacy classes.

Overall achievement:

Overall, the objective to increase the workplace literacy levels of approximately 225 employees so they can obtain additional training for technology upgrades, such as a higher level of SPC certification was not only met but exceeded. At National Semiconductor Corp. of 273 unduplicated participants who attended at least 25% of at least one course, 211 or 77% showed some gain or improvement was noted and 139 or 51% achieved mastery level. Eighteen (18) ESL participants were not included in the gain figure noted because the data was incomplete; however, anecdotal data and teacher observation and the pre/post testing that was completed indicate gain for most of them. At Natter Mfg., of 60 unduplicated participants who attended at least 25% of at least one course, 45 or 75% showed some gain or improvement and 23 or 38% achieved mastery level.

Combined figures for both companies resulted in the following data: There were 333 unduplicated participants in the program who attended at least 25% of at least one course. Of these 333, 256 or 77% showed some gain and 162 or 49% achieved mastery. If the other 18 ESL students were included, the gain figure was 274 or 82%.

At National Semiconductor Corp. 98% of participants in Pre-SPC achieved Level 1 SPC

certification. All participants upgraded to team status according to the Training Coordinator. Although the company originally planned an advanced training course for which the math refresher classes were necessary, subsequent conditions changed this plan and the class was not offered. It may be offered in the future.

At Natter Mfg., Inc. 7 participants in the ESL classes were able to take their re-certification test on the computer as all other employees do and achieved re-certification. This experience enhanced the employees self-esteem because they could use the computer to test just as all other employees do; prior to this, special arrangements were made for their certification tests.

Even though there was little or no opportunity for promotion during the project period due to national economic conditions which had a heavy impact on these two companies, these employees are better prepared and more likely to seek and/or be given opportunities to take advantage of technology upgrade training than they would have prior to participation in the workplace literacy project. The benefits of the program in regard to technical upgrade training opportunities will be further realized as the companies engage in additional training in the future.

Product Objective 3: increase targeted employees' ability to follow written instructions to the 80% proficiency level based on pre-test results

Activities conducted to achieve the objective:

The following classes were conducted:

A. **Natter Manufacturing, Inc.**

SESSION	CLASS	DATES	# SERVED (25%+ attendance)
ESL			
Session 1	Fall ESL I	Oct. 1990 - Jan. 1991	9
	Fall ESL II	Oct. 1990 - Jan. 1991	8
	ESL BASIC	Nov. 1990 - May 1991	3
Session 2	SPRING ESL I	Feb. 1991 - May 1991	7
	SPRING ESL II	Feb. 1991 - May 1991	4
Session 3	READ/WRITE	July 1991 - Sept. 1991	5
	CONVERSATION	July 1991 - Sept. 1991	5
READING & WRITING			
Session 3	TECH READ/WRITE	July 1991 - Oct. 1991	7

B. **National Semiconductor**

ESL			
Session 1	ESL 1	Sept. 1990 - Jan. 1991	11
Session 2	ESL 2	Feb. 1991 - June 1991	9
Session 3	ESL 3	July 1991 - Jan. 1992	11
READING & WRITING			
Session 3	TECH READ/WRITE	July 1991 - Nov. 1991	14

Projected Data Collection
Pre/Post Test Results
Simulated Tasks
Supervisor Feedback re transfer to job

Actual Data Collected
Pre/Post Test Results
Assignments/simulated tasks
Supervisor Feedback re transfer to job
Training Program Feedback Surveys

Product Objective 3: increase targeted employees' ability to follow written instructions to the 80% proficiency level based on pre-test results

Explanation of discrepancy if necessary:

There are some minor differences in the projected data collection in support of this objective and the actual data collected. Data gathered to indicate completion of this objective was garnered from surveys administered to supervisors for employees enrolled in the program. The evaluation design included plans to conduct interviews with supervisors at the end of each 12 hours of instruction. This seemed like a good idea, but in reality was very difficult to do. Supervisors felt this was too short a time period to see results. About halfway through the project period this was modified to twice during the class session.

Results:

Copies of the pre- and post-tests administered to participants and the results are in the participants' individual files.

A. Natter Manufacturing, Inc.

English as a Second Language--Teacher observation and anecdotal data indicated that seventeen (17) of eighteen (18) students enrolled in three classes in the Fall attended 25% of the course. All seventeen (17) improved their skills in varying degrees. In the two Spring classes, eleven(11) of thirteen (13) students completed 25% of the course; of these 11, eight (8) showed some gain and seven (7) achieved mastery. The ESL Conversation class had five (5) students of the seven (7) enrolled who completed 25% of the course; three (3) showed some gain and two (2) achieved mastery according to pre/post-test results. The ESL Reading/ Writing class had five (5) students who completed 25% of the course. Hard data was unavailable for this class.

In terms of unduplicated participants, 21 of the 23 participants attended at least 25% of the course; 16 of those 21, or 76%, either showed some overall gain from pre- to post-test or improvement was noted and 7, or 33%, achieved mastery level on one or more post-tests.

In relation to this specific objective for which data is available, seven (33%)participants showed gain and six (29%) of those participants achieved mastery.

Technical Reading/Writing--Out of 7 enrolled, 7 (100%) attended at least 25% of the course. Of the 7, 5 or 71% of participants showed gain to the mastery level.

In relation to this specific objective for which data is available, four (57%) participants achieved mastery.

B. National Semiconductor Corp.

Individual Employee Files/Assignments:
On file.

Product Objective 3: increase targeted employees' ability to follow written instructions to the 80% proficiency level based on pre-test results

Pre/Post Tests:

English as a Second Language--A limited amount of hard data in the form of pre-post test results is available for the ESL classes. Out of eleven (11) students enrolled in the ESL 1 class, 11 (100%) attended 25% of the course. Teacher observation, anecdotal data and evaluation indicated that all 11 improved their skills in varying degrees. Out of 9 students enrolled in the ESL 2 class, 9 (100%) attended 25% of the course. The 9 students showed an average gain of 13% on the pre- to post-tests for the objectives tested. Out of eleven (11) students enrolled in the ESL 3 class, 11 (100%) attended 25% of the course. In the ESL 3 class, 5 students who took the post-tests showed an average gain of 18% for the two units for which pre/post-tests were available. Data that is available suggests that gains were made by participants.

In terms of unduplicated participants, 28 of the 28 participants attended at least 25% of the course; 11 of those 28, or 39%, either showed some overall gain from pre- to post-test or improvement was noted.

Although testing was conducted that related to this objective, individual pre/post-test scores were not available to document achievement of this particular objective. However, seven (7) participants achieved an average increase of 24% in their scores from pre- to post-test.

Technical Reading/Writing--Out of 15 enrolled, 14 attended at least 25% of the course. Of the 14, 13 or 93% showed some gain and of those, 10 or 71% of participants showed gain to the mastery level .

In relation to this specific objective for which data is available, eleven (11)or 79% of the participants showed gain and eight (8) or 67% of those achieved mastery.

Survey Data:

At the close of each class, a Training Program Fedback survey was administered to participants. This evaluation focused on four major areas of the program: General Feedback (description and purpose of training); the Trainer (knowledge, teaching ability,); Training Materials; Program Design; Other (like/dislike program, relationship of program to job and other training opportunities, suggestions for improvement). The items fit one of two forms-- rating scale (5=high) or comments/suggestions. Responses indicated that all classes at Natter Mfg., Inc. were rated in the range from 4.27 to 5.0, the average rating for all classes was 4.60. The average rating for the program at both companies was 4.26. Class averages are listed below.

Refresher Math: Responses indicated that all classes were rated in the range from 4.57 to 5.00; the average rating for all classes was 4.73.

English as a Second Language--Responses indicated that all classes were rated in the range from 4.40 to 4.91; the average rating for all classes was 4.46.

Product Objective 3: increase targeted employees' ability to follow written instructions to the 80% proficiency level based on pre-test results

Technical Reading/Writing--Responses indicated that the average rating for the class was 4.46.

Workplace Communications--Responses indicated that all classes were rated in the range from 4.27 to 4.31; the average rating for all classes was 4.29.

The same Training Program Fedback survey was administered to participants at National Semiconductor. This evaluation focused on four major areas of the program: General Feedback (description and purpose of training); the Trainer (knowledge, teaching ability,); Training Materials; Program Design; Other (like/dislike program, relationship of program to job and other training opportunities, suggestions for improvement). The items fit one of two forms--a rating scale (5=high) or comments/suggestions. Responses indicated that all classes at National Semiconductor were rated in the range from 3.12 to 4.84, the average rating for all classes was 4.0. The average rating for the program at both companies was 4.26. Class averages are listed below.

Pre-SPC--Responses indicated that all classes were rated in the range from 4.06 to 4.70; the average rating for all classes was 4.38.

Refresher Math--Responses indicated that all classes were rated in the range from 3.12 to 4.75; the average rating for all classes was 4.64.

English as a Second Language--Responses indicated that all classes were rated in the range from 4.68 to 4.84; the average rating for all classes was 4.76.

Technical Reading/Writing--Responses indicated that the average rating for the class was 4.64.

Team Building--Responses indicated that the average rating for the class was 4.46.

Discussion of the Results:

Hard Data: The ESL start-up classes at both companies were truly experimental. Teachers and companies new to workplace literacy worked hard to determine needs and to design a curriculum that would be beneficial to employees. However, as in any new venture, a great deal was learned from the initial attempts. Although attempts were made to evaluate students, it was not in a formal, criterion-referenced style. No pre/post unit tests were given in the first round of ESL classes at either company. A pre-test designed by the instructors was heavily skewed to reading skills. The initial post-test was a modified version of the pre-test and heavy reliance was placed on teacher observation and anecdotal data for evaluation.

After the first round of ESL classes, instructors attempted to design curriculum that was more functional-context oriented and centered around units. Criterion-referenced tests were designed for the units. This enabled instructors to measure and collect data that was more

useful. However, it is still difficult to measure gains in ESL classes. Language acquisition is a complicated and lengthy process.

Another factor which should be considered in evaluating the data centers on the economic conditions the companies were experiencing from the fall of 1990 to the completion of the program in 1992. A severe economic slump in the national economy and computer-related industry had a significant impact on these companies and their employees. Employees were experiencing shut-downs and lay-offs throughout this time and the psychological environment this created was not conducive to learning. Employees are to be commended for their learning gains and companies for their commitment to the program in the face of hard times.

Soft Data: Results from survey data were overwhelmingly positive in terms of value and relationship of the courses to the employees' jobs. *ESL* participants reported increased understanding of their supervisors, increased speaking skills, and increased understanding of workplace language and their jobs. *Supervisors* also reported the same kinds of skills increases and in some cases reported increased ability to handle more complex responsibilities. They also reported reduced time spent in explaining tasks to employees, less need for use of an interpreter, and increased productivity, especially at Natter Manufacturing, Inc. *Technical Reading/Writing* participants reported increases in understanding workplace vocabulary and specifications. Managers reported seeing changes in both the number and quality of memos, passdowns, etc. written by employees who participated in the program. Self-confidence and sel esteem were greatly enhanced by program participation as reported by participants and supervisors.

Overall achievement:

Overall, the objective was partially met and relies heavily on teacher observation and anecdotal data for ESL. Both companies had a total of 51 participants in ESL who attended at least 25% of the course; this is unduplicated headcount. At Natter Mfg., of 21 participants who attended at least 25% of the course, 16 or 76%, either showed some overall gain from pre- to post-test or improvement was noted and 7 or 33% achieved mastery level on one or more post-tests. Specifically, 7 of 11 participants with pre/post-test scores(64%) showed gain on this objective and 6 (55%) achieved mastery. At National Semiconductor Corp., of 28 unduplicated participants enrolled in ESL, 11 or 39% showed some improvement. Hard data was unavailable for individuals, but pre-to post-test average scores indicate gain for approximately 7 others.

Together the companies had a total of 21 participants in Technical Reading/Writing who attended at least 25% of the course. Eighteen (18), or 86%, showed some overall gain and 15, or 71%, of those achieved mastery level. At Natter Mfg., of 7 participants who attended at least 25% of the course, 5 or 71% showed overall gain and achieved mastery level. Specifically, 4 of 7 participants with pre/post-test scores (57%) showed gain on this objective. At National Semiconductor Corp., 14 participants attended at least 25% of the course; of that 14, 13 or 93% showed some overall gain and 10 or 71% of those achieved mastery level. Specifically,

Product Objective 3: increase targeted employees' ability to follow written instructions to the 80% proficiency level based on pre-test results.

11 of 14 participants with pre/post-test scores (79%) showed gain on this objective and 8 of those (57%) achieved mastery.

Of the targeted 69 unduplicated participants for this objective, the majority, 45 (65%), showed overall gain or improvement was noted. Specifically, there are pre/post-test records for 32 participants. Of those, 22 of the 32 participants (69%) showed gain on this objective and 14 (44%)of those achieved mastery.

Product Objective 4: increase targeted employees' recognition/knowledge of work-related vocabulary to the 80% proficiency level based on pre-test results.

Activities conducted to achieve the objective:

The following classes were conducted:

A. **Natter Manufacturing, Inc.**

SESSION	CLASS	DATES	# SERVED (25%+ attendance)
ESL			
Session 1	Fall ESL I	Oct. 1990 - Jan. 1991	9
	Fall ESL II	Oct. 1990 - Jan. 1991	8
	ESL BASIC	Nov. 1990 - May 1991	3
Session 2	SPRING ESL I	Feb. 1991 - May 1991	7
	SPRING ESL II	Feb. 1991 - May 1991	4
Session 3	READ/WRITE	July 1991 - Sept. 1991	5
	CONVERSATION	July 1991 - Sept. 1991	5
READING & WRITING			
Session 3	TECH READ/WRITE	July 1991 - Oct. 1991	7

B. **National Semiconductor**

PRE-SPC			
Session 1	PRE-SPC	Sept. 1990 - Dec. 1990	141
ESL			
Session 1	ESL 1	Sept. 1990 - Jan. 1991	11
Session 2	ESL 2	Feb. 1991 - June 1991	9
Session 3	ESL 3	July 1991 - Jan. 1992	11
READING & WRITING			
Session 3	TECH READ/WRITE	July 1991 - Nov. 1991	14

Product Objective 4: increase targeted employees' recognition/knowledge of work-related vocabulary to the 80% proficiency level based on pre-test results.

Projected Data Collection
Pre/Post Test Results
Simulated Tasks
Supervisor Feedback re transfer to job

Actual Data Collected
Pre/Post Test Results
Assignments/simulated tasks
Supervisor Feedback re transfer to job
Training Program Feedback Surveys

Explanation of discrepancy if necessary:

There are some minor differences in the projected data collection in support of this objective and the actual data collected. Data gathered to indicate completion of this objective was garnered from surveys administered to employees enrolled in the program and to their supervisors. The evaluation design included a meeting between instructors and supervisors of enrollees at the end of each 12 hour period of instruction. The purpose of this meeting was to determine transfer of skills taught to the job. In reality, meeting this often was problematic because the supervisors usually did not see the transfer of skill that rapidly and they also believed the meetings unnecessary. Also, it was sometimes difficult to set up a meeting with supervisors for some time, so one 12 hour period would end and another be partially completed before the meeting occurred for the first time. For these reasons, the instructors and supervisors met twice--halfway through the course and at the end of the course.

Results:

Copies of the pre- and post-tests administered to participants and the results are in the participants' individual files.

A. Natter Manufacturing, Inc.

English as a Second Language--Teacher observation and anecdotal data indicated that seventeen (17) of eighteen (18) students enrolled in three classes in the Fall attended 25% of the course. All seventeen (17) improved their skills in varying degrees. In the two Spring classes, eleven(11) of thirteen (13) students completed 25% of the course; of these 11, eight (8) showed some gain and, of those, seven (7) achieved mastery. The ESL Conversation class had five (5) students of the seven (7) enrolled who completed 25% of the course; three (3) showed some gain according to pre/post-test results and two (2) of those achieved mastery. The ESL Reading/Writing class had five (5) students who completed 25% of the course. Hard data was unavailable for this class.

In terms of unduplicated participants, 21 of the 23 participants attended at least 25% of the course; 15 of those 21, or 71%, either showed some overall gain from pre- to post-test or improvement was noted and 7, or 33%, achieved mastery level on one or more post-tests.

Product Objective 4: increase targeted employees' recognition/knowledge of work-related vocabulary to the 80% proficiency level based on pre-test results.

In relation to this specific objective for which data is available, seven (33%)participants showed gain and six (29%) of those achieved mastery.

Technical Reading/Writing--Out of 7 enrolled, 7 (100%) attended at least 25% of the course. Of the 7, 5 or 71% of participants showed gain to the mastery level .

In relation to this specific objective for which data is available, four (57%) participants achieved mastery.

B. National Semiconductor Corp.

Individual Employee Files/Assignments:
On file.

Pre/Post Tests:

Pre-SPC--Out of 141 enrolled, 141 attended at least 25% of the course. Of the 141, 91 or 65% of the participants showed some gain and 56 or 40% of those showed gain to the mastery level. Actually, only 106 participants took both pre- and post-tests. Based on this figure, 91 or 86% showed gain and 56 or 53% achieved mastery level. According to company records, 98% of the employees who took the Pre-SPC course later achieved SPC Level 1 certification.

English as a Second Language--A limited amount of hard data in the form of pre-post test results is available for the ESL classes. Out of eleven (11) students enrolled in the ESL 1 class, 11 (100%) attended 25% of the course. Teacher observation, anecdotal data and evaluation indicated that all 11 improved their skills in varying degrees. Out of 9 students enrolled in the ESL 2 class, 9 (100%) attended 25% of the course. The 9 students showed an average gain of 13% on the post-test for the objectives tested. Out of eleven (11) students enrolled in the ESL 3 class, 11 (100%) attended 25% of the course. In the ESL 3 class, 5 students who took the post-tests showed an average gain of 18% for the two units for which pre/post-tests were available. Data that is available suggests that gains were made by participants.

Although testing was conducted that related to this objective, individual pre/post-test scores were not available to document achievement of this particular objective. However, the average score decreased for the nine participants who took the pre- and post-test.

Technical Reading/Writing--Out of 15 enrolled, 14 attended at least 25% of the course. Of the 14, 13 or 93% of the participants showed some gain and 10 or 71% of those achieved the mastery level.

In relation to this specific objective for which data is available, thirteen (13) or 93% of participants showed gain and eight (8) or 67% of those achieved mastery.

Product Objective 4: increase targeted employees' recognition/knowledge of work-related vocabulary to the 80% proficiency level based on pre-test results.

Survey Data:

At the close of each class, a Training Program Fedback survey was administered to participants. This evaluation focused on four major areas of the program: General Feedback (description and purpose of training); the Trainer (knowledge, teaching ability,); Training Materials; Program Design; Other (like/dislike program, relationship of program to job and other training opportunities, suggestions for improvement). The items fit one of two forms--a rating scale (5=high) or comments/suggestions. Class averages are listed below.

A. Natter Manufacturing, Inc.

English as a Second Language--Responses indicated that all classes were rated in the range from 4.40 to 4.91; the average rating for all classes was 4.46.

Technical Reading/Writing--Responses indicated that the average rating for the class was 4.46.

B. National Semiconductor Corp.

Pre-SPC--Responses indicated that all classes were rated in the range from 4.06 to 4.70; the average rating for all classes was 4.38.

English as a Second Language--Responses indicated that all classes were rated in the range from 4.68 to 4.84; the average rating for all classes was 4.76.

Technical Reading/Writing--Responses indicated that the average rating for the class was 4.64.

Discussion of the Results:

Hard Data: The ESL start-up classes at both companies were truly experimental. Teachers and companies new to workplace literacy worked hard to determine needs and to design a curriculum that would be beneficial to employees. However, as in any new venture, a great deal was learned from the initial attempts. Although attempts were made to evaluate students, it was not in a formal, criterion-referenced style. No pre/post unit tests were given in the first round of ESL classes at either company. A pre-test designed by the instructors was heavily skewed to reading skills. The initial post-test was a modified version of the pre-test and heavy reliance was placed on teacher observation and anecdotal data for evaluation.

After the first round of ESL classes, instructors attempted to design curriculum that was more functional-context oriented and centered around units. Criterion-referenced tests were designed for the units. This enabled instructors to measure and collect data that was more useful. However, it is still difficult to measure gains in ESL classes. ESL language skill

Product Objective 4: increase targeted employees' recognition/knowledge of work-related vocabulary to the 80% proficiency level based on pre-test results.

development is a complicated and lengthy process.

Other factors which should be considered in evaluating the data center on the economic conditions the companies were experiencing from the fall of 1990 to the completion of the program in 1992. A severe economic slump in the national economy and the computer industry had a significant impact on these companies and their employees. Employees were experiencing shut-downs and lay-offs throughout this time and the psychological environment this creates is not conducive to learning. Employees are to be commended for their learning gains and companies for their commitment to the program in the face of hard times.

The Pre-SPC workshops were the first ones taught in the program and, as a result, experienced all the difficulties encountered in establishing a new program. Consequently, not all participants completed both pre- and post-tests. Of the 141 who completed 25% of the course, only 106 participants took both tests. Based on this data, gains were significant and mastery was achieved by over half of those who completed testing.

Even though the Technical Reading/Writing class at National Semiconductor was interrupted for approximately two months due to a "soft-shutdown," participants still showed learning gains. This may be associated with the functional context curriculum allowing them to use their new knowledge on the job so retention was higher than might be expected in more traditional Adult Basic Education classes.

Soft Data: Results from survey data were overwhelmingly positive in terms of value and relationship of the courses to the employees' jobs. *ESL* participants reported increased understanding of their supervisors, increased speaking skills, and increased understanding of workplace language and their jobs. Supervisors also reported the same kinds of skills increases and in some cases reported increased ability to handle more complex responsibilities, reduced time spent in explaining tasks to employees, less need for use of an interpreter, and increased productivity. *Pre-SPC* participants reported significant gains in their understanding of the math and technical language used in the SPC field. They also reported greater understanding of the value of SPC to the company and their role in meeting the standards. *Technical Reading/Writing* participants reported increases in workplace vocabulary, ability to write memos, passdowns, and reports and understanding of the job. Self-confidence and self-esteem were greatly enhanced by program participation as reported by participants and supervisors.

Overall achievement:

Overall, the objective was partially met and relies heavily on teacher observation and anecdotal data for ESL. Of the 198 targeted unduplicated participants who attended at least 25% of at least one course for this objective, 132 (67%) showed gain and 76 (38%) achieved mastery level.

Both companies had a total of 51 unduplicated participants in ESL who attended at least 25% of the course. At Natter Mfg., of 21 participants who attended at least 25% of the course, 16 or 76% either showed some gain from pre- to post-test or improvement was noted and 7 or 33%

Product Objective 4: increase targeted employees' recognition/knowledge of work-related vocabulary to the 80% proficiency level based on pre-test results.

achieved mastery level. At National Semiconductor Corp., of 31 participants enrolled in ESL, 28 unduplicated participants attended 25% of the course. Gain or improvement was noted for 11 of those; individual data was incomplete for the balance of the participants but aggregate data indicated gain for an additional eight students.

Together the companies had a total of 21 participants in Technical Reading/Writing who attended at least 25% of the course. Of that total number, 18 or 86% showed some gain and of those 15 or 71% achieved mastery level. At Natter Mfg., of 7 participants who attended at least 25% of the course, 5 or 71% showed gain to the mastery level. At National Semiconductor Corp., 14 participants attended at least 25% of the course; of that 14, 13 or 93% showed some gain and 10 or 71% of those achieved mastery level.

Out of 141 enrolled in the Pre-SPC workshops, 141 attended at least 25% of the course. Of the 141, 91 or 65% of the participants showed some gain and 56 or 40% of those showed gain to the mastery level. Actually, only 106 participants took both pre- and post-tests. Based on this figure, 91 or 86% showed gain and 56 or 53% achieved mastery level. According to company records, 98% of the employees who took the Pre-SPC course later achieved SPC Level 1 certification.

Product Objective 5: increase communications skills appropriate to the workplace

Activities conducted to achieve the objective:

The following classes were conducted:

A. Natter Manufacturing, Inc.

SESSION	CLASS	DATES	# SERVED (25%+ attendance)
ESL			
Session 1	Fall ESL I	Oct. 1990 - Jan. 1991	9
	Fall ESL II	Oct. 1990 - Jan. 1991	8
	ESL BASIC	Nov. 1990 - May 1991	3
Session 2	SPRING ESL I	Feb. 1991 - May 1991	7
	SPRING ESL II	Feb. 1991 - May 1991	4
Session 3	READ/WRITE	July 1991 - Sept. 1991	5
	CONVERSATION	July 1991 - Sept. 1991	5
READING & WRITING			
Session 3	TECH READ/WRITE	July 1991 - Oct. 1991	7
COMMUNICATIONS			
Session 2	WORKPLACE	Mar. 1991 - June 1991	12
Session 3	WORKPLACE	July 1991 - Oct. 1991	7

B. National Semiconductor

ESL			
Session 1	ESL 1	Sept. 1990 - Jan. 1991	11
Session 2	ESL 2	Feb. 1991 - June 1991	9
Session 3	ESL 3	July 1991 - Jan. 1992	11
READING & WRITING			
Session 3	TECH READ/WRITE	July 1991 - Nov. 1991	14
TEAM BUILDING			
Session 3	TEAM BUILDING	Nov. 1991-Jan. 1992	22

Product Objective 5: increase communications skills appropriate to the workplace

Projected Data Collection	Actual Data Collected
Individual Employee Files	Individual Employee Files
Assignments	Assignments
Pre/Post Test Results	Pre/Post Test Results
Observation/monitoring of skill transfer to job/team meetings	Supervisor Surveys
Monitor written communications for accuracy	Training Program Feedback Surveys

Explanation of discrepancy if necessary:

There are some minor differences in the projected data collection in support of this objective and the actual data collected. Data gathered to indicate completion of this objective was garnered from surveys administered to employees enrolled in the program and their supervisors. The evaluation design included a meeting between instructors and supervisors of enrollees at the end of each 12 hour period of instruction. The purpose of this meeting was to determine transfer of skills taught to the job. In reality, meeting this often was problematic because the supervisors usually did not see the transfer of skill that rapidly and they also believed the meetings unnecessary. Also, it was sometimes difficult to set up a meeting with supervisors for some time, so one 12 hour period would end and another be partially completed before the meeting occurred for the first time. For these reasons, the instructors and supervisors met twice--halfway through the course and at the end of the course. Also, monitoring written communications was not practical. Simulated task assignments were substituted.

Results:

A. Natter Manufacturing, Inc.

English as a Second Language--Teacher observation and anecdotal data indicated that seventeen (17) of eighteen (18) students enrolled in three classes in the Fall attended 25% of the course. All seventeen (17) improved their skills in varying degrees. In the two Spring classes, eleven(11) of thirteen (13) students completed 25% of the course; of these 11, eight (8) showed some gain and seven (7) of those achieved mastery. The ESL Conversation class had five (5) students of the seven (7) enrolled who completed 25% of the course; three (3) showed some gain according to pre/post-test results and two (2) achieved mastery . The ESL Reading/Writing class had five (5) students who completed 25% of the course. Hard data was unavailable for this class.

In terms of unduplicated participants, 21 of the 23 participants attended at least 25% of the course; 16 of those 21, or 76%, either showed some overall gain from pre- to post-test or improvement was noted and 7 or 33% achieved mastery level on one or more post-tests.

Anecdotal data, teacher/supervisor observation, and simulated tasks indicated improvement for the majority of the students.

Product Objective 5: increase communications skills appropriate to the workplace.

Technical Reading/Writing--Out of 7 enrolled, 7 (100%) attended at least 25% of the course. Of the 7, 5 or 71% of participants showed gain to the mastery level .

In relation to this specific objective for which data is available, four (4) participants achieved mastery.

Workplace Communications--Out of 20 enrolled, 19 (95%) attended at least 25% of the course. Of the 19, 14 or 74% showed some gain and 7 or 37% of those showed gain to the mastery level.

B. National Semiconductor, Corp.

English as a Second Language--A limited amount of hard data in the form of pre-post test results is available for the ESL classes. Out of eleven (11) students enrolled in the ESL 1 class, 11 (100%) attended 25% of the course. Teacher observation, anecdotal data and evaluation indicated that all 11 improved their skills in varying degrees. Out of 9 students enrolled in the ESL 2 class, 9 (100%) attended 25% of the course. The 9 students showed an average gain of 13%. Out of eleven (11) students enrolled in the ESL 3 class, 11 (100%) attended 25% of the course. In the ESL 3 class, 5 students who took the post-tests showed an average gain of 18% for the two units for which pre/post-tests were available. Data that is available suggests that gains were made by participants.

The average score for five students increased 23% from pre- to post-test for this particular objective. No other data was available.

Technical Reading/Writing--Out of 15 enrolled, 14 attended at least 25% of the course. Of the 14, 13 or 93% of the participants showed some gain and 10 or 71% of those showed gain to the mastery level.

Team Building--Out of 23 enrolled, 22 attended at least 25% of the course. Each participant did a pre and post self-evaluation and a team evaluation. Fourteen(14) participants who actually completed the course reported gains in awareness or knowledge of ten teamwork concepts. Supervisors evaluated each team also. Results of self-evaluations and team evaluations completed by participants and supervisors yielded results which indicated increases in awareness or knowledge of ten teamwork concepts.

Pre-Post Self Evaluation:

A self-evaluation form consisting of nine teamwork concepts which were to be ranked from 1 (low) to 5 (high) was administered to participants. The total average score was 3.52 for the concepts. A post-self evaluation which used the same items asked participants to measure the percent of increase in their awareness and/or knowledge of those same concepts. Individual self-evaluations showed average increases of 62% to 78% for the ten teamwork concepts. The average percent of increase was 70.78 percent.

Product Objective 5: increase communications skills appropriate to the workplace

Pre-Post Team Evaluation:

A team-evaluation form consisting of ten teamwork concepts which were to be ranked from 1 (low) to 5 (high) was administered to each participant to evaluate his/her team. The average score was 3.24 for the concepts. A post-self evaluation which used the same items asked participants to measure the percent of increase in their awareness and/or knowledge of those same concepts. Individual member evaluations of the team showed average increases of 62% to 77% for the ten teamwork concepts. The average percent of increase was 71.33 percent.

Pre-Post Manager's Team Evaluation:

A team-evaluation form consisting of ten teamwork concepts which were to be ranked from 1 (low) to 5 (high) was administered to each manager. The total average score was 3.00 for the concepts. A post-self evaluation which used the same items asked participants to measure the percent of increase in their awareness and/or knowledge of those same concepts. Supervisors' evaluations of the three teams' increase in awareness or knowledge of ten teamwork concepts showed average increases of 46%, 67% and 71% for an average increase of 61%. The total average percent of increase was 61.33 percent for the three teams.

Discussion of the Results:

Hard Data: Results indicate that the training resulted in gains in communication skills. Gains were very difficult to measure for ESL participants and initially relied heavily on anecdotal data and teacher/supervisor observation and evaluation of improvement. Team Building was conducted as a pilot course and due to the nature of the course, a pre-test of content knowledge did not seem an appropriate measure. The measure of success for such a course often comes far after the course ends and teams have more opportunity to put into practice the concepts they learned. Therefore, the measures used were highly subjective, i.e., self-evaluations and team evaluations by participants and supervisors. These indicated that this was not only a very popular course, but the employees rated it very highly in terms of its relationship/value to their jobs and the new direction the company is pursuing, i.e., self-managed teams. They reported increases for themselves and their teams in ability to work as a team, express their point of view, handle conflict, etc. Workplace Communications participants showed gains in content knowledge and ability to make presentations to teams and/or management groups. Technical Reading/Writing participants showed gains in both vocabulary and written communications skills related to such on-the-job activities such as writing passdowns, ECN changes, and memos. Although not specifically tested, it is anticipated that this carries over to other forms of written communication on the job.

Soft Data: Results from survey data were positive in terms of value and relationship of the courses to the employees' jobs. *Workplace Communications and Team Building* participants believed that all employees should take the course and stated that it helped them understand not only their co-workers better but also management's perspective. They also reported increased ability to communicate with their co-workers and function better on teams, express themselves better in problem-solving, understand the team concept, and speak up in meetings, etc. *ESL* participants reported increased understanding of their supervisors, increased speaking skills, and increased understanding of workplace language. *Supervisors* of ESL employees also

reported the same kinds of skills increases and in some cases reported increased ability to handle more complex responsibilities. In addition they reported reduced time spent in explaining tasks to employees, less need for use of an interpreter, and increased productivity, especially at Natter Manufacturing, Inc.. Self-confidence and self-esteem were greatly enhanced by program participation as reported by participants and supervisors. Supervisors noted that participants tended to ask more questions, work more independently, show increased job knowledge, seek more responsibility, help others more often, move to more difficult jobs, and apply new knowledge to the job.

Overall achievement:

Overall, the objective was partially met and relied heavily on teacher observation and anecdotal data for ESL. Both companies had a total of 51 unduplicated participants in ESL who attended at least 25% of the course. At Natter Mfg., of 21 participants who attended at least 25% of the course, 16 or 76% either showed some gain from pre- to post-test or improvement was noted and 7 or 33%% achieved mastery level. At National Semiconductor Corp., of 28 unduplicated participants enrolled in ESL, data that was available indicated gain for 11; data for other individuals was incomplete. However, aggregate data indicated gain for approximately eight others.

Together the companies had a total of 21 participants in Technical Reading/Writing who attended at least 25% of the course. Of that total number, 18 or 86% showed some gain and of those 15 or 71% achieved mastery level. At Natter Mfg., of 7 participants who attended at least 25% of the course, 5 or 71% achieved the mastery level. At National Semiconductor Corp., 14 participants attended at least 25% of the course; of that 14, 13 or 93% showed some gain and 10 or 71% achieved mastery level.

Workplace Communications and Team Building had a total of 41 participants who attended 25% of the course. Of that number, 28 or 68% showed gain and seven (7) showed mastery. While participants in Team Building showed gain in their awareness and knowledge of teamwork concepts, these are the types of skills that will show up later as employees have the opportunity to use the skills.

Of the targeted 110 unduplicated participants for this objective, the majority (73 or 66%) showed gain. Other aggregate data that is available suggests that approximately 18 other ESL participants increased their communications skills. This increases the number to 91 or 81% of the target population.

Product Objective 6: increase participation of targeted employees in employee team meetings by 50%.

Activities conducted to achieve the objective:

The following classes were conducted:

A. **Natter Manufacturing, Inc.**

SESSION	CLASS	DATES	# SERVED (25%+ attendance)
ESL			
Session 1	Fall ESL I	Oct. 1990 - Jan. 1991	9
	Fall ESL II	Oct. 1990 - Jan. 1991	8
	ESL BASIC	Nov. 1990 - May 1991	3
Session 2	SPRING ESL I	Feb. 1991 - May 1991	7
	SPRING ESL II	Feb. 1991 - May 1991	4
Session 3	READ/WRITE	July 1991 - Sept. 1991	5
	CONVERSATION	July 1991 - Sept. 1991	5
COMMUNICATIONS			
Session 2	WORKPLACE	Mar. 1991 - June 1991	12
Session 3	WORKPLACE	July 1991 - Oct. 1991	7

B. **National Semiconductor**

ESL			
Session 1	ESL 1	Sept. 1990 - Jan. 1991	11
Session 2	ESL 2	Feb. 1991 - June 1991	9
Session 3	ESL 3	July 1991 - Jan. 1992	11
TEAM BUILDING			
Session 3	TEAM BUILDING	Nov. 1991-Jan. 1992	22

Product Objective 6: increase participation of targeted employees in employee team meetings by 50%.

Projected Data Collection	Actual Data Collected
Observation at 2 team meetings to establish base (average of responses/meeting)	Individual Employee Files
Observation at meetings throughout project period	Assignments
	Pre/Post Test Results
	Supervisor Evaluations/ Surveys
	Training Program Feedback Surveys
	Self-evaluations
	Team Evaluations

Explanation of discrepancy if necessary:

There are some minor differences in the projected data collection in support of this objective and the actual data collected. The initial plan to observe at team meetings and establish a baseline response pattern which could be compared to post-training data and observation of team meetings throughout the period was not feasible because neither company had teams which met on a regular basis. Therefore, data to support this objective was drawn from hard data sources and soft data sources as noted. Self-evaluations and team evaluations were used in the Team Building class.

Results:

A. Natter Manufacturing, Inc.

Individual Employee Files/Assignments:
On file.

Pre/Post Tests:

ESL--English as a Second Language--Teacher observation and anecdotal data indicated that seventeen (17) of eighteen (18) students enrolled in three classes in the Fall attended 25% of the course. All seventeen (17) improved their skills in varying degrees. In the two Spring classes, eleven (11) of thirteen (13) students completed 25% of the course; of these 11, eight (8) showed some gain and seven (7) of those achieved mastery. The ESL Conversation class had five (5) students of the seven (7) enrolled who completed 25% of the course; three (3) showed some gain according to pre/post-test results and two (2) achieved mastery. The ESL Reading/Writing class had five (5) students who completed 25% of the course. Hard data was unavailable for this class.

In terms of unduplicated participants, 21 of the 23 participants attended at least 25% of the course; 15 of those 21, or 71%, either showed some overall gain from pre- to post-test or improvement was noted and 7, or 33%, achieved mastery level on one or more post-tests.

No data was collected in support of this objective.

Product Objective 6: increase participation of targeted employees in employee team meetings by 50%.

Workplace Communications--Out of 20 enrolled, 19 (95%) attended at least 25% of the course. Of the 19, 14 or 74% of the participants showed some gain and 7 or 37% of those achieved the mastery level.

No data was collected in support of this objective.

B. National Semiconductor Corp.

Individual Employee Files/Assignments:
On file.

Pre/Post Tests:

English as a Second Language-A limited amount of hard data in the form of pre-post test results is available for the ESL classes. Out of eleven (11) students enrolled in the ESL 1 class, 11 (100%) attended 25% of the course. Teacher observation, anecdotal data and evaluation indicated that all 11 improved their skills in varying degrees. Out of 9 students enrolled in the ESL 2 class, 9 (100%) attended 25% of the course. The 9 students showed an average gain of 13% on the post-tests for the objectives tested. Out of eleven (11) students enrolled in the ESL 3 class, 11 (100%) attended 25% of the course. In the ESL 3 class, 5 students who took the post-tests showed an average gain of 18% for the two units for which pre/post-tests were available. Data that is available suggests that gains were made by participants.

No data was collected in support of this objective.

Team Building--Out of 23 enrolled, 22 attended at least 25% of the course. Each participant did a pre and post self-evaluation and a team evaluation. Supervisors evaluated each team also. Results of self-evaluations and team evaluations completed by 14 , or 64%, of the participants who completed the course and three supervisors yielded results which indicated increases in awareness or knowledge of ten teamwork concepts. The data is presented below.

Pre-Post Self Evaluation:

A self-evaluation form consisting of nine teamwork concepts which were to be ranked from 1 (low) to 5 (high) was administered to participants. The total average score was 3.52 for the concepts. A post-self evaluation which used the same items asked participants to measure the percent of increase in their awareness and/or knowledge of those same concepts. The average percent of increase was 70.78 percent.

Pre-Post Team Evaluation:

A team-evaluation form consisting of 9 teamwork concepts which were to be ranked (5 =high) was administered to each participant to evaluate the team. The average score was 3.24 for the concepts. A post-self evaluation which used the same items asked participants to measure the percent of increase in their awareness and/or knowledge of those same concepts.

Product Objective 6: increase participation of targeted employees in employee team meetings by 50%.

Individual member evaluations of the team showed average increases of 62% to 77% for the ten teamwork concepts. The average percent of increase was 71.33 percent.

Pre-Post Manager Team Evaluation:

A team-evaluation form consisting of nine teamwork concepts which were to be ranked (5=high) was administered to each manager. The total average score was 3.00 for the concepts. A post-self evaluation which used the same items asked participants to measure the percent of increase in their awareness and/or knowledge of those same concepts. Supervisors' evaluations of the three teams' increase in awareness or knowledge of ten teamwork concepts showed average increases of 46%, 67% and 71% for an average increase of 61%. The total average percent of increase was 61.33 percent for the three teams.

Survey Data:

Training Program Feedback:

This evaluation was administered to participants at the end of the course. Items focused on instructor content knowledge and teaching skills, materials, program design, relationship of course content to job, etc. The items were ranked from 1 (low) to 5 (high). The total average score was 4.46.

No data was collected in support of this objective.

Discussion of the Results:

Hard Data: Even though the structure and use of teams within the companies precluded the collection of hard data in the manner originally planned, results indicate that the training resulted in gains in communications skills. Gains were difficult to measure for ESL participants and relied heavily on anecdotal data and observation/evaluation by the teacher and supervisors. Team Building was conducted as a pilot course and due to the nature of the course, a pre-test of content knowledge did not seem an appropriate measure. The measure of success for such a course often comes far after the course ends and teams have more opportunity to put into practice the concepts they learned. Therefore, the measures used were highly subjective, i.e., self-evaluations and team evaluations by participants and managers. These indicated that this was not only a very popular course, but the employees rated it very highly in terms of relationship/value to their jobs and the new direction the company is pursuing, i.e. , self-managed teams, and increases in their ability to express themselves in their teams, handle conflict, etc. This can be interpreted to mean that these behaviors will carry over into team meetings as the companies, especially National Semiconductor, continue with the goal of implementing self-managing teams. Hard data does not support the increase in participation by 50% for targeted employees primarily because there were no consistent team meetings to measure participation. However, it can be surmised that employee participation did increase in other forms of oral communications on the job.

Product Objective 6: increase participation of targeted employees in employee team meetings by 50%.

Survey Data: Data from the Training Feedback Survey indicates that employees valued the courses and believed the courses were well-taught, had definite relationship to their jobs, and provided them with useful skills.

Soft Data: Results from survey data were overwhelmingly positive in terms of value and relationship of the courses to the employees' jobs. *Workplace Communications and Team Building* participants believed that all employees should take the course and stated that it helped them understand not only their co-workers better but also management's perspective. A significant number indicated the course enabled them to perform in ways they were unable to before the course. For example, responses indicated participants understood more about teamwork, could express themselves better in problem-solving activities, work better as a team member, understand why teams have problems and not take it personally, and communicate better as a team player. *ESL* participants reported increased understanding of their supervisors, increased speaking skills, and increased understanding of workplace language. Supervisors also reported the same kinds of skills increases and in some cases reported increased ability to handle more complex responsibilities, reduced time spent in explaining tasks to employees, less need for use of an interpreter, and increased productivity. Self- confidence and self-esteem were greatly enhanced by program participation as reported by participants and supervisors.

Overall achievement:

The objective was not met in terms of hard data that supports an increase of 50% in participation in team meetings. There was no way to collect the supporting data because the companies did not have teams which met on a regular basis. It can only be stated that there is evidence to support the claim that participants did increase their oral communications skills.

From a total of 90 unduplicated participants, 55 (61%) showed gains in oral communications skills or knowledge and awareness of skills necessary for successful team participation. Other anecdotal and aggregate data available suggests that approximately eighteen other ESL participants increased their oral communications skills. This increases the number of participants who showed gain to 73 or 79% of the total population.

Product Objective 7: increase employees' document literacy related to manuals, work orders, catalogues, etc. used on the work site to the 80% proficiency level based on pre-test results.

Activities conducted to achieve the objective:

The following classes were conducted:

A. **Natter Manufacturing, Inc.**

SESSION	CLASS	DATES	# SERVED (25%+ attendance)
ESL			
Session 1	Fall ESL I	Oct. 1990 - Jan. 1991	9
	Fall ESL II	Oct. 1990 - Jan. 1991	8
	ESL BASIC	Nov. 1990 - May 1991	3
Session 2	SPRING ESL I	Feb. 1991 - May 1991	7
	SPRING ESL II	Feb. 1991 - May 1991	4
Session 3	READ/WRITE	July 1991 - Sept. 1991	5
	CONVERSATION	July 1991 - Sept. 1991	5
MATH			
Session 1	REFRESHER	Oct. 1990 - Jan. 1991	12
	REFRESHER	Oct. 1990 - Jan. 1991	8
Session 2	REFRESHER	Feb. 1991 - May 1991	5
	ADVANCED	Feb. 1991 - May 1991	10
READING & WRITING			
Session 3	TECH READ/WRITE	July 1991 - Oct. 1991	7

B. **National Semiconductor**

PRE-SPC			
Session 1	PRE-SPC	Sept. 1990 - Dec. 1990	141
ESL			
Session 1	ESL 1	Sept. 1990 - Jan. 1991	11
Session 2	ESL 2	Feb. 1991 - June 1991	9
Session 3	ESL 3	July 1991 - Jan. 1992	11

Product Objective 7: increase employees' document literacy related to manuals, work orders, catalogues, etc. used on the work site to the 80% proficiency level based on pre-test results.

REFRESHER MATH

Session 1	REFRESHER IMA	Feb. 1991 - May 1991	11
	REFRESHER 2MA	Feb. 1991 - May 1991	9
	REFRESHER 3MA	Feb. 1991 - May 1991	15
	REFRESHER 4MA	Feb. 1991 - May 1991	17
	REFRESHER 5MA	Feb. 1991 - May 1991	16
	REFRESHER 6MA	Feb. 1991 - May 1991	15
Session 3	REFRESHER 1MB	May 1991 - August 1991	15
	REFRESHER 2MB	May 1991 - August 1991	6
	REFRESHER 3MB	May 1991 - August 1991	8
	REFRESHER 4MB	July 1991 -Dec. 1991	8
	REFRESHER 5MB	June 1991 - Sept. 1991	9
	REFRESHER 6MB	May 1991 - August 1991	8

READING & WRITING

Session 3	TECH READ/WRITE	July 1991 - Nov. 1991	14

Projected Data Collection
Individual Employee Files
Assignments
Pre/Post Test Results
Supervisor Feedback
re use of materials
Observation of skill
transfer to job

Actual Data Collected
Individual Employee Files
Assignments
Pre/Post Test Results
Supervisor Feedback
re use of materials
Observation of skill
transfer to job

Explanation of discrepancy if necessary:

Supervisor feedback and observation of transfer to job were difficult to obtain for the same reasons noted for previous objectives.

Results:

A. Natter Manufacturing, Inc.

Individual Employee Files/Assignments:
On file.

Product Objective 7: increase employees' document literacy related to manuals, work orders, catalogues, etc. used on the work site to the 80% proficiency level based on pre-test results.

Pre/Post Tests:

Refresher Math-- Out of 43 enrolled, 35 (81%) attended at least 25% of the course. Of the 35, 21 or 60% of the participants showed some gain and of those 11 or 31% of those showed gain to the mastery level .

English as a Second Language--Teacher observation and evaluation indicated that seventeen (17) students enrolled in three classes in the Fall improved their skills in varying degrees. In the two Spring classes, eleven(11) students completed 25% of the course; of these 11, eight (8) showed some gain and seven (7) achieved mastery. The ESL Conversation class had five (5) students who completed 25% of the course; three (3) showed some gain according to pre/post-test results and two (2) achieved mastery. The ESL Reading/Writing class had five (5) students who completed 25% of the course. Hard data was unavailable for this class.

In terms of unduplicated participants, 21 of the 23 participants attended at least 25% of the course; 16 of those 21, or 76%, either showed some overall gain from pre- to post-test or improvement was noted and 7, or 33%, achieved mastery level on one or more post-tests.

In relation to this specific objective for which data is available, seven (33%)participants showed gain and six (29%) of those participants achieved mastery.

Technical Reading/Writing--Out of 7 enrolled, 7 (100%) attended at least 25% of the course. Of the 7, 5 or 71% of participants showed gain to the mastery level.

In relation to this specific objective for which data is available, four (57%) participants showed gain to the mastery level.

B. National Semiconductor Corp.

Pre/Post Tests:

Refresher Math-- Out of 156 enrolled, 137 (88%) attended at least 25% of the course. Of the 137, 113 or 82% of the participants showed some gain and 85 or 63% of those showed gain to the mastery level.

Pre-SPC--Out of 141 enrolled, 141 attended at least 25% of the course. Of the 141, 91 or 65% of the participants showed some gain and 56 or 40% of those showed gain to the mastery level. Actually, only 106 participants took both pre- and post-tests. Based on this figure, 91 or 86% showed gain and 56 or 53% achieved mastery level. According to company records, 98% of the employees who took Pre-SPC achieved SPC Level 1 certification.

English as a Second Language--A limited amount of hard data in the form of pre-post test results is available for the ESL classes. Teacher observation and evaluation indicated that eleven (11) students enrolled in the ESL 1 class improved their skills in varying degrees. In

Product Objective 7: increase employees' document literacy related to manuals, work orders, catalogues, etc. used on the work site to the 80% proficiency level based on pre-test results.

the ESL 2 class, 9 students showed an average gain of 13% on the post-tests for the objectives tested. In the ESL 3 class, 5 students showed an average gain of 18% for the two units for which pre/post-tests were available. See discussion of results. The data that is available indicates that of 32 students enrolled, 24 of 26 participants who completed showed some gain.

In terms of unduplicated participants, 28 of the 28 participants attended at least 25% of the course; 11 of those 28, or 39%, either showed some overall gain from pre- to post-test or improvement was noted.

Although testing was conducted that related to this objective, individual pre/post-test scores were not available to document achievement of this particular objective. However, twelve (12) participants achieved an average increase of 16% in their scores from pre- to post-test.

Technical Reading/Writing--Out of 15 enrolled, 14 attended at least 25% of the course. Of the 14, 13 or 93% of the participants showed some gain and of those 10 or 71% of those showed gain to the mastery level.

In relation to this specific objective for which data is available, eleven (79%) participants showed gain and eight (57%) achieved mastery level.

Discussion of the Results:

Hard Data: Results indicate that the training resulted in gains in document literacy. Increased ability to perform math functions required on the job in itself increases the ability to understand the documents used. Although not specifically tested, use of charts and graphs, time cards, etc. was included in the math and Pre-SPC curricula. Not all Pre-SPC participants took both pre- and post-tests due to difficulties encountered during the start-up phase of the project; therefore, the results are skewed to the negative side when all participants who completed 25% of the course are included in the count. Gains were difficult to measure for ESL participants, but where pre/post test results are available they indicate improved ability to understand and use the documents related to their jobs. Anecdotal and other aggregate data suggests that more students made gains and probably achieved mastery than were included in the data available. Supervisors support this conclusion through anecdotal data. Technical Reading/Writing scores indicated gains from pre- to post-test in reading specifications used on the job and other kinds of charts and graphs.

Soft Data: Results from survey data were positive in terms of value and relationship of the courses to the employees' jobs. Even in classes in which document literacy gains were not the primary goal and pre/post-test data was not collected, i.e., *Math and Pre-SPC*, anecdotal data and self-evaluation/reporting by participants indicated that increases in this skill did occur. Math participants reported immediate use of skills learned/refreshed and equated it with increases in understanding their jobs better and enabling them to assume more responsibility, often on their own initiative, and increased accuracy in paperwork and math. They also equated

Product Objective 7: increase employees' document literacy related to manuals, work orders, catalogues, etc. used on the work site to the 80% proficiency level based on pre-test results.

it with being able to see and solve problems on their own without assistance. Participants also reported being able to understand and fill out forms used on their jobs more accurately and seeing the value of accuracy. *Pre-SPC* participants indicated a better understanding of what SPC was all about and that it made more sense to them as a result of the course. They also could see the value of it to the company and the need for accuracy in charting, math, etc. *ESL* participants reported increased understanding of workplace language. Supervisors also reported the same kinds of skills increases. *Technical Reading/Writing* participants reported increases in ability to write better, more concise memos, passdowns, and ECN reports and to read and understand specifications and work vocabulary. Self-confidence and self-esteem were greatly enhanced by program participation as reported by participants and supervisors. Supervisors noted participants showed increased job knowledge, applied new knowledge to the job, increased ability to handle the forms and paperwork used on the job, etc. Managers reported seeing an increase in the number and quality of memos, passdowns, etc. written by participants.

Overall achievement:

Overall, the objective was partially met. At National Semiconductor of 268 unduplicated participants who attended at least 25% of at least one course, 201 or 75% showed some gain or improvement was noted and 139 or 52% achieved mastery level. At Natter Mfg., of 47 unduplicated participants who attended at least 25% of at least one course, 34 or 72% showed some gain or improvement was noted and 16 or 34% achieved mastery level. If the results included the eighteen other ESL participants, it is anticipated that the gain/mastery figures would be higher.

Combined figures for both companies resulted in the following data: There were 315 unduplicated participants in these classes. Of these 315, 235 or 75% showed some gain or improvement was noted and 156 (50%) achieved mastery.

Product Objective 8: increase writing skills used on the job for applications, tax forms, insurance forms, work orders, etc.

Activities conducted to achieve the objective:

The following classes were conducted:

A. Natter Manufacturing, Inc.

SESSION	CLASS	DATES	# SERVED (25%+ attendance)
ESL			
Session 1	Fall ESL I	Oct. 1990 - Jan. 1991	9
	Fall ESL II	Oct. 1990 - Jan. 1991	8
	ESL BASIC	Nov. 1990 - May 1991	3
Session 2	SPRING ESL I	Feb. 1991 - May 1991	7
	SPRING ESL II	Feb. 1991 - May 1991	4
Session 3	READ/WRITE	July 1991 - Sept. 1991	5
	CONVERSATION	July 1991 - Sept. 1991	5
MATH			
Session 1	REFRESHER	Oct. 1990 - Jan. 1991	12
	REFRESHER	Oct. 1990 - Jan. 1991	8
Session 2	REFRESHER	Feb. 1991 - May 1991	5
	ADVANCED	Feb. 1991 - May 1991	10
READING & WRITING			
Session 3	TECH READ/WRITE	July 1991 - Oct. 1991	7

B. National Semiconductor

PRE-SPC			
Session 1	PRE-SPC	Sept. 1990 - Dec. 1990	141

Product Objective 8: increase writing skills used on the job for applications, tax forms, insurance forms, work orders, etc.

ESL

Session 1	ESL 1	Sept. 1990 - Jan. 1991	11
Session 2	ESL 2	Feb. 1991 - June 1991	9
Session 3	ESL 3	July 1991 - Jan. 1992	11

REFRESHER MATH

Session 1	REFRESHER 1MA	Feb. 1991 - May 1991	11
	REFRESHER 2MA	Feb. 1991 - May 1991	9
	REFRESHER 3MA	Feb. 1991 - May 1991	15
	REFRESHER 4MA	Feb. 1991 - May 1991	17
	REFRESHER 5MA	Feb. 1991 - May 1991	16
	REFRESHER 6MA	Feb. 1991 - May 1991	15
Session 3	REFRESHER 1MB	May 1991 - August 1991	15
	REFRESHER 2MB	May 1991 - August 1991	6
	REFRESHER 3MB	May 1991 - August 1991	8
	REFRESHER 4MB	July 1991 -Dec. 1991	8
	REFRESHER 5MB	June 1991 - Sept. 1991	9
	REFRESHER 6MB	May 1991 - August 1991	8

READING & WRITING

Session 3	TECH READ/WRITE	July 1991 - Nov. 1991	14

Projected Data Collection
- Simulated writing Tasks
- Actual Writing Activities
- Supervisor Feedback re skill transfer

Actual Data Collected
- Individual Employee Files
- Assignments
- Pre/Post Test Results
- Survey Data

Explanation of discrepancy if necessary:

Supervisor feedback and observation of transfer to job were difficult to obtain for the same reasons noted for previous objectives.

Product Objective 8: increase writing skills used on the job for applications, tax forms, insurance forms, work orders, etc.

Results:

A. Natter Manufacturing, Inc.

Individual Employee Files/Assignments:
On file.
Pre/Post Tests:

Refresher Math-- Out of 43 enrolled, 35 (81%) attended at least 25% of the course. Of the 35, 21 or 60% of the participants showed some gain and 11 or 31% of those achieved the mastery level.

English as a Second Language--Teacher observation and evaluation indicated that seventeen (17) students enrolled in three classes in the Fall improved their skills in varying degrees. In the two Spring classes, eleven (11) students completed 25% of the course; of these 11, d eight (8) showed some gain and seven (7) achieved mastery. The ESL Conversation class had five (5) students who completed 25% of the course and three (3) showed some gain and two (2) achieved mastery according to pre/post-test results. The ESL Reading/Writing class had five (5) students who completed 25% of the course. Hard data was unavailable for this class.

In terms of unduplicated participants, 21 of the 23 participants attended at least 25% of the course; 16 of those 21, or 76%, either showed some overall gain from pre- to post-test or improvement was noted and 7, or 33%, achieved mastery level on one or more post-tests.

Technical Reading/Writing--Out of 7 enrolled, 7 (100%) attended at least 25% of the course. Of the 7, 5 or 71% of participants showed gain to the mastery level.

B. National Semiconductor, Corp.

Pre/Post Tests:

Refresher Math-- Out of 156 enrolled, 137 (88%) attended at least 25% of the course. Of the 137, 113 or 82% of the participants showed some gain and 86 or 63% of those achieved mastery level.

Pre-SPC--Out of 141 enrolled, 141 attended at least 25% of the course. Of the 141, 91 or 65% of the participants showed some gain and 56 or 40% of those showed gain to the mastery level. Actually, only 106 participants took both pre- and post-tests. Based on this figure, 91 or 86% showed gain and 56 or 53% achieved mastery level. According to company records, 98% of the employees who took Pre-SPC, achieved SPC certification.

English as a Second Language--A limited amount of hard data in the form of pre-post test results is available for the ESL classes. Teacher observation and evaluation indicated that eleven (11) students enrolled in the ESL 1 class improved their skills in varying degrees. In

Product Objective 8: increase writing skills used on the job for applications, tax forms, insurance forms, work orders, etc.

the ESL 2 class, 9 students showed an average gain of 13% on the post-tests for the objectives tested. In the ESL 3 class, 5 students showed an average gain of 18% for the two units for which pre/post-tests were available. See discussion of results. The data that is available indicates that of 32 students enrolled, 24 of 26 participants who completed showed some gain.

In terms of unduplicated participants, 100% of the 28 participants attended at least 25% of the course; 11 of those 28, or 39%, either showed some overall gain from pre- to post-test or improvement was noted. Data for other individuals was incomplete or unavailable. Aggregate data suggests gain in skills for approximately 18 others.

Technical Reading/Writing--Out of 15 enrolled, 14 attended at least 25% of the course. Of the 14, 13 or 93% of the participants showed some gain and 10 or 71% of those achieved mastery level.

Discussion of the Results:

Hard Data: Results indicate that the training resulted in gains in writing skills used on the job, even in classes in which this was not a primary goal, i.e., math and Pre-SPC. Gains were very difficult to measure for ESL participants and relied heavily on anecdotal data and teacher and supervisor observation of the transfer of skills to the job. Technical Reading/Writing scores indicated gains from pre- to post-test. Because writing was an integral part of the classes, gains measured in relation to other objectives can be applied to writing also.

Soft Data: Results from survey data were overwhelmingly positive in terms of value and relationship of the courses to the employees' jobs. Math participants reported immediate use of skills learned/refreshed and equated it with increases in understanding their jobs better and enabling them to assume more responsibility, often on their own initiative, and increased accuracy in paperwork and math. They also equated it with being able to see and solve problems on their own without assistance. Participants also reported being able to understand better and fill out forms used on their jobs more accurately and seeing the value of accuracy. Pre-SPC participants indicated a better understanding of what SPC was all about and that it made more sense to them as a result of the course, they could see the value of it to the company and the need for accuracy in charting, math, etc. They reported increased ability to understand and use the charts. ESL participants reported increased understanding of workplace language. Supervisors also reported the same kinds of skills increases. Technical Reading/Writing participants reported increases in their ability to write better, more concise memos, passdowns, and ECN reports and to read and understand specifications and work vocabulary. Self-confidence and self esteem were greatly enhanced by program participation as reported by participants and supervisors. Supervisors noted participants showed increased job knowledge, applied new knowledge to the job, increased ability to handle the forms and paperwork used on the job, etc.

Overall achievement:

Overall, the objective was partially met. At National Semiconductor Corp. of 268

Product Objective 8: increase writing skills used on the job for applications, tax forms, insurance forms, work orders, etc.

unduplicated participants who attended at least 25% of at least one course, 202 or 75% showed some gain or improvement was noted and 139 or 52% achieved mastery level. At Natter Mfg., of 46 unduplicated participants who attended at least 25% of at least one course, 33 or 72% showed some gain or improvement was noted and 15 or 33% achieved mastery level. If the results included the eighteen other ESL participants, it is anticipated that the gain/mastery figures would be higher.

Combined figures for both companies resulted in the following data: There were 314 unduplicated participants who attended at least 25% of at least one course. Of these 314, 235 or 75% showed some gain or improvement was noted and 154 (49%) achieved mastery.

Product Objective 9: increase quantitative literacy skills related to numerical operations performed on the job to the 80% proficiency level based on pre-test results.

Activities conducted to achieve the objective:

The following classes were conducted:

A. **Natter Manufacturing, Inc.**

SESSION	CLASS	DATES	# SERVED (25%+ attendance)
MATH			
Session 1	REFRESHER	Oct. 1990 - Jan. 1991	12
	REFRESHER	Oct. 1990 - Jan. 1991	8
Session 2	REFRESHER	Feb. 1991 - May 1991	5
	ADVANCED	Feb. 1991 - May 1991	10

B. **National Semiconductor**

PRE-SPC			
Session 1	PRE-SPC	Sept. 1990 - Dec. 1990	141
REFRESHER MATH			
Session 1	REFRESHER 1MA	Feb. 1991 - May 1991	11
	REFRESHER 2MA	Feb. 1991 - May 1991	9
	REFRESHER 3MA	Feb. 1991 - May 1991	15
	REFRESHER 4MA	Feb. 1991 - May 1991	17
	REFRESHER 5MA	Feb. 1991 - May 1991	16
	REFRESHER 6MA	Feb. 1991 - May 1991	15
Session 3	REFRESHER 1MB	May 1991 - August 1991	15
	REFRESHER 2MB	May 1991 - August 1991	6
	REFRESHER 3MB	May 1991 - August 1991	8
	REFRESHER 4MB	July 1991 -Dec. 1991	8
	REFRESHER 5MB	June 1991 - Sept. 1991	9
	REFRESHER 6MB	May 1991 - August 1991	8

Product Objective 9: increase quantitative literacy skills related to numerical operations performed on the job to the 80% proficiency level based on pre-test results.

Projected Data Collection
Pre/Post Test Results
Simulated Tasks
Application to job/use of equipment

Actual Data Collected
Pre/Post Test Results
Assignments
Individual Employee Files
Supervisor Surveys
Training Program Feedback Surveys

Explanation of discrepancy if necessary:

There are some minor differences in the projected data collection in support of this objective and the actual data collected. Simulated tasks are incorporated in the assignments given in class and in some instances were used as practice assignments only. Instructors solicited feedback from supervisors regarding he transfer of skills to the job and/or use of equipment. Training Program feedback forms, administered to participants at the end of the class focused questions on relationship/value of training to the job.

Results:

Copies of the pre- and post-tests administered to participants and the results are in the participants' individual files.

A. Natter Manufacturing, Inc.

Individual Employee Files/Assignments:
On file.

Pre/Post Tests:
Refresher Math-- Out of 43 enrolled, 35 (81%) attended at least 25% of the course. Of the 35, 21 or 60% of the participants showed some gain and 11 or 31% of those showed gain to the mastery level.

B. National Semiconductor Corp.

Individual Employee Files/Assignments:
On file.

Pre/Post Tests:
Refresher Math-- Out of 156 enrolled, 137 (88%) attended at least 25% of the course. Of the 137, 113 or 82% of the participants showed some gain and 86 or 63% of those achieved mastery level.

Pre-SPC--Out of 141 enrolled, 141 attended at least 25% of the course. Of the 141, 91 or 65% of the participants showed some gain and 56 or 40%% of those showed gain to the

Product Objective 9: increase quantitative literacy skills related to numerical operations performed on the job to the 80% proficiency level based on pre-test results.

mastery level. Actually, only 106 participants took both pre- and post-tests. Based on this figure, 91 or 86% showed gain and 56 or 53% achieved mastery level. According to company records, 98% of the employees who took Pre-SPC, achieved SPC certification.

Discussion of the Results:

Hard Data: Results indicate that the training resulted in gains in quantitative literacy levels. *Math* results indicate the most significant gains. Even though some participants did not achieve the mastery level, examination of the range of scores indicates that some who scored at very low levels on the pre-test achieved significant gains. *Pre-SPC* results also indicate significant achievements. This course, the first in the program, was beset by a series of difficulties such as scheduling conflicts, communications problems between the training department/literacy program and company supervisors which surfaced in a variety of ways. These problems continued in the post-testing process so that only 106 participants took both the pre- and post-tests. If the results of the post-test are examined on the basis of this information, the data shows significantly different results. These results are presented above.

Soft Data: Results from survey data were overwhelmingly positive in terms of value and relationship of the courses to the employees' jobs. *Math* participants reported immediate use of skills learned/refreshed and equated it with increases in understanding their jobs better and enabling them to assume more responsibility, often on their own initiative. They also equated it with being able to see and solve problems on their own without assistance. *Pre-SPC* participants indicated a better understanding of what SPC was all about and that it made more sense to them as a result of the course, they could see the value of it to the company and the need for accuracy in charting, math, etc. Self-confidence and self-esteem were greatly enhanced by program participation as reported by participants and supervisors.

Overall achievement:

Overall, the objective to increase the quantitative literacy skills of targeted employees was met. Both companies had a total of 264 unduplicated participants who attended at least 25% of at least one course; 198 or 75% of the participants showed some gain and 139 or 53% of those achieved mastery level.

At Natter Mfg., of 26 unduplicated participants who completed at least 25% of the course in Refresher or Advanced Math, 14 or 54% showed some gain and or 8 or 31%% achieved mastery level. At National Semiconductor Corp., of 238 unduplicated participants who completed at least 25% of the course in Refresher Math, Pre-SPC or both, 184 or 77% showed some gain and 131 or 55% of those achieved mastery level.

Administrative Issues

The partnership achieved or partially achieved all but one of the goals. Goals that were only partially achieved included Product Objectives 3-9. These are addressed in detail in the section on Product Objectives.

Staff development for faculty needs to be strengthened, especially in the areas of developing instructional objectives and test design. Some of the problems we faced centered around curriculum design and this was addressed part-way through the grant by hiring a part-time curriculum writer.

USDE needs to allow longer start-up periods. The education process for the business partner is lengthy, yet it is critical to the success of the project. Laying the groundwork and establishing the buy-in by all levels at the business takes time and a lot of effort. Likewise, the learning curve is very high for the education partner--staff development for a functional context program is critical and learning about the business partner is lengthy also. In addition, a three-year grant period is more realistic. Eighteen months is just not long enough to plan and implement a project of this scope.

Contrary to adult learning theory which states that adults like individualized, self-paced instruction, we found that many workers like this approach but also want the teacher-lecture format. Perhaps this has something to do with pre-conceived notions of the role of teacher as "imparter of knowledge" rather than that of facilitator with the adult learner in charge of his/her own learning. When we discovered this, we adjusted the teaching style to accommodate some "lecture" for a short period of the session and then went on to more individualized, self-paced learning methodology.

Assessment is a continuing challenge in all adult learning programs. Traditional, standardized tests were not used in our program, but we faced the issues of validity and reliability and had to be content with face validity. This is an arena that needs more exploration and opportunities to share information.

Cost-benefit analysis sounds good in theory, but in actuality this is very difficult to do. There are too many variables within the business that affect productivity, scrap rate, etc. A very good program may not have any impact on these measures due to variables not within control of the education partner. Perhaps we should begin to look at other kinds of impact on the company such as changes in who receives the training and the training dollars (management or workers), changes in the way training is administered by the business because of spin-off learning from the education partner about how to conduct training, etc.

CONCLUSIONS

The project was successful. Both companies were pleased with the outcomes of the project and noticed considerable changes in many employees. The functional-context approach is better received than traditional ABE programs by both management and employees. Both education and business partners learned a great deal from each other and believed that it was truly a partnership. Future project leaders should be aware that the learning curve is very high on both sides of the partnership during the initial phases

of the grant. Project directors should take time to lay effective groundwork with all parties at all levels before launching into classes. Failure to do so will probably cause many problems and perhaps doom the project to failure.

Staff development should not be underestimated. Many fine teachers will have difficulty adjusting to the new challenges of the functional-context approach. Minimally, review of such theoretical bases as lesson planning, developing objectives, developing a course outline, designing activities, and developing criterion-referenced tests should form the base for staff development. More extensive staff development regarding this approach may be necessary depending on faculty needs. In addition, differences between workplace literacy and general literacy, "reading to learn" vs "reading to do," the teacher's role in workplace literacy, etc. should also be covered extensively in staff development. Another aspect of staff development should include training on the importance of tracking and documenting student progress. Historically, the field of adult education has not accepted responsibility for gathering hard data regarding student progress. It is time for the practitioners in the field to shoulder this responsibility and do more than say "I know he/she made progress" and yet have no data to back up that statement.

An unexpected outcome of the project occurred in the area of family literacy. Many employees stated that they had increased their involvement in such activities as helping with homework, reading to their children, becoming involved in school activities, etc. Thus, participation in workplace literacy has a definite impact on the literacy development of children, possibly increasing the value of literacy/learning in the home and breaking the cycle of intergenerational illiteracy. This is an aspect of workplace literacy programs that should be documented in other programs and used as a springboard to develop programs which will increase work-family literacy connections.

RECOMMENDATIONS

National Workplace Literacy programs should be continued. This partnership has been valuable to business and education partners alike.

Extend the grant period to a minimum of three years. Eighteen months is not enough time to start, develop, and complete a project. There is not time enough to really analyze what is occurring and in many instances see the results of the classes. Over a longer period of time supervisors would probably be able to see more long-term changes in behaviors and skills. Additional evaluation methodology might be developed if there were a longer time period.

Appoint a task force/working group to explore assessment and testing issues in relation to workplace literacy. This group could collect samples of functional context, criterion-referenced assessments/tests, portfolio assessment, etc. that have been used in projects and then develop a list of assessment/test resources, write a position paper on the status of assessment/testing in workplace literacy and future goals.

Dissemination Activities

As part of our project we conducted the following dissemination activities: staff of SLCC made presentations at six conferences, distributed project information at another

conference, presented to three in-house meetings or groups, and appeared on a local radio show. The project was cited in one publication, an article was published in a national policy study, an article was printed in a local newspaper, and two other articles were published in a booklet distributed at a conference.

Presentations

* **November 1990: Salt Lake Community College**
  Chief Executive Officers' Round Table Breakfast
  "Workplace Literacy"
  Julie Van Moorhem, John Anjewierden, Blair Carruth

* **April 1991: Sun Valley, Idaho**
  Mountain Plains Adult Education Association Conference(MPAEA)
  Workplace 2000: Panel Discussion
  "Building Industrial Leaders Through Literacy"
  Mary Mellott and Julia Balcom

  "Workplace Literacy: Gaining Supervisor Support"
  Julie Van Moorhem

* **June 1991: Logan, Utah**
  June Vocational/Applied Technology Conference
  "Workforce Literacy: What Are We Doing?"
  Julie Van Moorhem

* **September 1991: Salt Lake City**
  KSL Radio Show
  "Workplace Literacy"
  SLCC--Mary Mellott, Blair Carruth, John Anjewierden
  Natter Manufacturing, Inc.--Joy Spindler, Maurine Simmons

* **October 1991: Montreal, Canada**
  American Association of Adult, Continuing and Community Education International Conference (AAACE)
  Distributed SLCC Workplace Literacy Project Descriptions
  Julie Van Moorhem

* **October 1991: Park City, Utah**
  Utah Association for Adult, Community and Continuing Education Conference (UAACCE)
  "Workplace Literacy in the 90's"
  Julie Van Moorhem

* **November 1991: Albuquerque, New Mexico**
  Rocky Mountain Region VIII Teachers of English as a Second Language Conference (TESOL)
  "Designing a Workplace Curriculum for ESL Employees"
  Mary Mellott

- **December 1991: Salt Lake Community College**
  Salt Lake Community College Board of Trustees
  "Workplace Literacy: A Partnership for Success"
  Julie V. Van Moorhem

- **March 1992: Kansas City, Missouri**
  Midwest Regional Reading and Study Skills Conference
  "Workplace Literacy: Partnerships for Success"
  Julie Van Moorhem

- **May 1992: Salt Lake City, Utah**
  Mountain Plains Adult Education Association Conference (MPAEA)
  "Workplace Literacy: Partnerships for Success"
  Julie Van Moorhem

Articles

An article appeared in a local newspaper, The Salt Lake Tribune, November 1991.

In addition, at least two curriculum books developed during the project will be sent to ERIC. They are currently being proofread/edited and permission of the companies obtained before they are submitted.

The project is listed in Literacy at Work: The Workbook for Program Developers by Jorie Phillipi, published by Simon & Schuster Workplace Resources and the National Alliance of Business, as a source of information regarding planning and conducting the kinds of functional context activities described in the book.

The project director, training coordinator at National Semiconductor, and the internal evaluator submitted an article to the Work in America Institute for inclusion in their national study entitled Job-Linked Literacy Programs: Innovative Strategies at Work. This was published in Spring 1992.

Evaluation Activities

This project was unique in that two evaluators, internal and external, were used. The internal evaluator had input at various points throughout the project and evaluated curriculum manuals, student files, and monitored time lines for the project. The external evaluator made three site visits and monitored curriculum development activities, achievement of goals, and conducted interviews with employee participants, supervisors, and management at each company.

A variety of instruments were developed for use in evaluating the project. Teacher made assessment instruments, survey instruments, and evaluation instruments were designed. These were administered across all employee levels during the project period. The instruments are listed below:

* Training Program Feedback At the close of each class, a Training Program Fedback form was administered to participants. This evaluation focused on four major areas of the program: General Feedback (description and purpose of training); the Trainer (knowledge, teaching ability,); Training Materials; Program Design; Other (like/dislike program, relationship of program to job and other training opportunities, suggestions for improvement). The items fit one of two forms--a rating scale (5=high) or comments/suggestions.

* Employee self-evaluations, supervisor evaluation of employee, and interviews with employees at entry-level, supervisor, and management levels were conducted also.

* Post-Program Participant Survey was administered to participants at the close of the program. Demographic data and program data were gathered. The survey focused on questions in the following areas: Skills acquired through the program that were not present before participation; achieving personal goals (promotion, bid on new job, filling out accident/sick papers for work, being recognized/appreciated, understanding the job better); achieving educational goals (participate in/complete GED courses, enroll in college courses or professional training outside of work, increased participation in company training programs); increase community involvement (voting, reading newspaper, helping children with home work, reading, etc., volunteering in community/school programs); recommending program to co-workers; recommending program changes.

* Post-Program Supervisor Rating was administered to supervisors at the close of the program. Supervisors ranked employee participants on a 4-point scale (4=high). Items focused on issues such as: changes in employee behaviors (quantity/ quality of work, job attitude, attendance, job knowledge); promotion/raise recommendation if economic conditions permitted; change in supervisor's confidence in the employee's performance; employees asking about opportunities for promotion, other positions, assuming additional responsibility, etc.

EVALUATION MATRIX

	Self	Employee	Instructor	Course	Program
Employee	X		X	X	X
Supervisor		X		X	X
Trainer/Instructor		X		X	X
Evaluators			X	X	X

NATIONAL WORKPLACE LITERACY PROGRAM
INFORMATION FORM

Part 1: Program Parameters

1. Target No. to be Served: 225

2. No. Served at Each Site to Date:

Site 1.	289	Site 6.	
Site 2.	69	Site 7.	
Site 3.		Site 8.	
Site 4.		Site 9.	
Site 5.		Site 10.	

3. Total No. Served: 358

4. Fed. Funds Obligated: $392,733.00

5. Matching Funds/ In-Kind $289,960.62
Includes value release time

6. Value Release Time:

7. No. Participating in Programs Offered:

Basic Skills	405
GED	
ESL	80

8. Contact Hours Provided: 11,983

(Contact Hours are the number of teaching hours that workers receive)

Part 2: Participation Data

1. Mean Age Participants: 34

2. Sex: No. Males 161 No. Females 197

3. Race/ Ethnicity: No. who are:

White	237	Am. Indian/ Alaska Native	4
Black	2		
Hispanic	39	Asian/Pacific Islander	76

4. No. Single Head of Household: 48

5. No. Limited English Proficient: 53

6. Outcomes — No. Participants

a. Tested higher on basic skills	279
b. Improved communication skills	73
c. Increased productivity	
d. Improved attendance at work	
e. Increased self-esteem	

7. Years with the company — No. Participants

Unemployed	
0-5	74
6-10	53
11-15	33
16-over	